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**Patentanmeldung Nr. | Patent application No. | Demande de brevet n°**

03019619.0



Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

R C van Dijk

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Anmelder/Applicant(s)/Demandeur(s):

Bayer CropScience S.A.
55, avenue René Cassin
69009 Lyon
FRANCE

Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se referer à la description.)

Pesticides

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Description

Pesticides

The invention relates to novel 5-substituted-alkylaminopyrazole derivatives, processes for their preparation, to compositions thereof, and to their use for the control of pests (including arthropods and helminths).
The control of insects, arachnids and helminths with 1-arylpyrazole compounds has been described in, for example, patent publication numbers WO 98/28279, WO 98/24769, WO 99/62886 and U.S. 5,629,335.

However, since modern pesticides must meet a wide range of demands, for example regarding level, duration and spectrum of action, use spectrum, toxicity, combination with other active substances, combination with formulation auxiliaries or synthesis, and since the occurrence of resistances is possible, the development of such substances can never be regarded as concluded, and there is constantly a high demand for novel compounds which are advantageous over the known compounds, at least as far as some aspects are concerned.

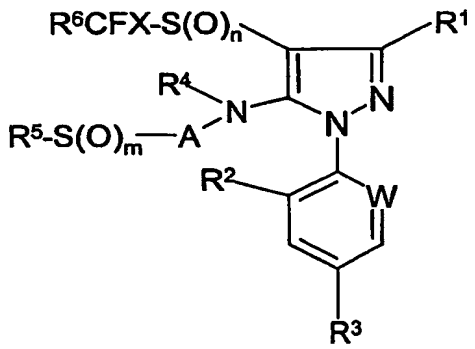
It is an object of the present invention to provide new pesticides which may be used in domestic companion animals.
It is advantageous to apply pesticides to animals in oral form so as to prevent the possible contamination of humans or the surrounding environment.
Another object of the invention is to provide new pesticides which may be applied to animals in oral form and which are substantially non-emetic.
Another object of the invention is to provide new pesticides which may be used in lower dose than existing pesticides.
Another object of the invention is to provide new pesticides which are safer to the user and the environment.

Another object of the invention is to provide new pesticides which maintain a high level of oral control of flea and tick pests for a longer time period and consequently require less frequent dosing.

These objects are met in whole or in part by the present invention.

The compounds of the invention have improved pesticidal properties in various aspects, specifically with regard to the control of parasites in animals by oral administration. When administered as a single oral dose to animals (particularly dogs and cats) the compounds of the invention maintain a high level of control of flea and tick pests for a longer time period than prior art compounds.

The present invention provides a compound which is a 5-substituted-alkylaminopyrazole derivative of formula (I):




(I)

wherein:

$R^1$ is $CSNH_2$ or $C(=N-Z)-S(O)_r-Q$;

W is C-halogen or N;

$R^2$ is hydrogen or Cl;

$R^3$ is $CF_3$, $OCF_3$ or $SF_5$;

Q is $(C_1-C_6)$-alkyl or $-CH_2R^7$;

Z is H, $(C_1-C_6)$-alkyl, $(C_1-C_6)$-haloalkyl, $(C_3-C_6)$-alkenyl, $(C_3-C_6)$-alkynyl, $-(CH_2)_qR^7$, $COR^8$, $CO_2-(C_1-C_6)$-alkyl, $S(O)_pR^8$, $CO_2-CH_2R^7$, $CO_2-(C_3-C_6)$-alkenyl or $CO_2-(C_3-C_6)$-alkynyl;

$R^4$ is hydrogen, $(C_2-C_6)$-alkenyl, $(C_2-C_6)$-haloalkenyl, $(C_2-C_6)$-alkynyl, $(C_2-C_6)$-haloalkynyl, $(C_3-C_7)$-cycloalkyl, $(C_3-C_7)$-cycloalkyl-$(C_1-C_6)$-alkyl, $CO_2$-$(C_3-C_6)$-alkenyl, $CO_2$-$(C_3-C_6)$-alkynyl, $-CO_2-(CH_2)_q-R^7$, $-CH_2R^7$, $-CH_2R^9$, $OR^7$, $OR^8$, $COCO_2R^{10}$ or $COCONR^{10}R^{11}$; or $CO_2$-$(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy and $(C_1-C_3)$-alkylthio; or $(C_1-C_6)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_6)$-alkoxy, $(C_1-C_6)$-haloalkoxy, $(C_3-C_7)$-cycloalkyl, $S(O)_pR^8$ and $CO_2$-$(C_1-C_6)$-alkyl;

A is $(C_1-C_6)$-alkylene or $(C_1-C_6)$-haloalkylene;

$R^5$ is $(C_2-C_6)$-alkenyl, $(C_2-C_6)$-haloalkenyl, $(C_2-C_6)$-alkynyl, $(C_3-C_6)$-cycloalkyl or $-(CH_2)_qR^7$; or $(C_1-C_6)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_6)$-alkoxy, $(C_1-C_6)$-haloalkoxy, $(C_3-C_7)$-cycloalkyl, $S(O)_pR^8$ and $CO_2$-$(C_1-C_6)$-alkyl;

X is F or Cl;

$R^6$ is F, Cl or Br;

$R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_6)$-alkyl, $(C_1-C_6)$-haloalkyl, $(C_1-C_6)$-alkoxy, $(C_1-C_6)$-haloalkoxy, CN, $NO_2$, $S(O)_pR^8$, $CO_2$-$(C_1-C_6)$-alkyl, $COR^8$, $NR^{12}R^{13}$ and OH;

$R^8$ is $(C_1-C_6)$-alkyl or $(C_1-C_6)$-haloalkyl;

$R^9$ is a heteroaromatic radical having 5 or 6 ring atoms and 1, 2 or 3 hetero atoms in the ring selected from the group consisting of N, O and S, unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_4)$-alkyl, $(C_1-C_4)$-haloalkyl, $(C_1-C_4)$-alkoxy, $(C_1-C_4)$-haloalkoxy, $NO_2$, CN, $CO_2(C_1-C_6)$-alkyl, $S(O)_pR^8$ and OH;

$R^{10}$ and $R^{11}$ are each independently H or $R^5$;

or the radical $NR^{10}R^{11}$ forms a five- to seven-membered saturated ring which optionally contains an additional hetero atom in the ring which is selected from O, S and N, the ring being unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_6)$-alkyl, $(C_1-C_6)$-haloalkyl and $CO_2$-$(C_1-C_6)$-alkyl;

$R^{12}$ and $R^{13}$ are each independently H or $(C_1-C_6)$-alkyl;

m, n, p and r are each independently zero, one or two; and

q is zero or one;
or a pesticidally acceptable salt thereof.

The invention also encompasses any stereoisomer, enantiomer, geometric isomer or tautomer, and mixtures of the compounds of formula (I).
By the term "pesticidally acceptable salts" is meant salts the anions or cations of which are known and accepted in the art for the formation of salts for pesticidal use. Suitable acid addition salts include salts with inorganic acids, for example hydrochlorides, sulphates, phosphates and nitrates and salts with organic acids for example acetic acid. In formula (I) when m is 0 the term salts is understood also to include sulfonium salts, for example alkyl or benzyl sulfonium halide salts such as the methyl sulfonium chloride salts.

In the present specification, including the accompanying claims, the aforementioned substituents have the following meanings:
Halogen atom means fluorine, chlorine, bromine or iodine.
The term "halo" before the name of a radical means that this radical is partially or completely halogenated, that is to say, substituted by F, Cl, Br, or I, in any combination, preferably by F or Cl.
Alkyl groups and portions thereof (unless otherwise defined) may be straight- or branched-chain.
The expression "($C_1$-$C_6$)-alkyl" is to be understood as meaning an unbranched or branched hydrocarbon radical having 1, 2, 3, 4, 5 or 6 carbon atoms, such as, for example a methyl, ethyl, propyl, isopropyl, 1-butyl, 2-butyl, 2-methylpropyl or tert-butyl radical.
Alkyl radicals and also in composite groups, unless otherwise defined, preferably have 1 to 4 carbon atoms.
"($C_1$-$C_6$)Haloalkyl" means an alkyl group mentioned under the expression "($C_1$-$C_6$)alkyl" in which one or more hydrogen atoms are replaced by the same number of identical or different halogen atoms, such as monohaloalkyl, perhaloalkyl, $CF_3$, $CHF_2$, $CH_2F$, $CHFCH_3$, $CF_3CH_2$, $CF_3CF_2$, $CHF_2CF_2$, $CH_2FCHCl$, $CH_2Cl$, $CCl_3$, $CHCl_2$ or $CH_2CH_2Cl$.

The expression "($C_1$-$C_6$)-alkylene" is to be understood as meaning an unbranched or branched chain alkanediyl group having from 1 to 6 carbon atoms, according to the IUPAC Nomenclature of Organic Chemistry 1979, for example -$CH_2$-, -$CH_2CH_2$-, -$CH_2CH_2CH_2$- or -$CH_2CH(CH_3)$-.

The expression "($C_1$-$C_6$)-haloalkylene" is to be understood to mean an alkylene group mentioned under the expression "($C_1$-$C_6$)-alkylene", in which one or more hydrogen atoms are replaced by the same number of identical or different halogen atoms.

"($C_1$-$C_6$)Alkoxy" means an alkoxy group whose carbon chain has the meaning given under the expression "($C_1$-$C_6$)alkyl". "Haloalkoxy" is, for example, $OCF_3$, $OCHF_2$, $OCH_2F$, $CF_3CF_2O$, $OCH_2CF_3$ or $OCH_2CH_2Cl$.

"($C_2$-$C_6$)Alkenyl" means an unbranched or branched non-cyclic carbon chain having a number of carbon atoms which corresponds to this stated range and which contains at least one double bond which can be located in any position of the respective unsaturated radical. "($C_2$-$C_6$)Alkenyl" accordingly denotes, for example, the vinyl, allyl, 2-methyl-2-propenyl, 2-butenyl, pentenyl, 2-methylpentenyl or the hexenyl group.

"($C_2$-$C_6$)Alkynyl" means an unbranched or branched non-cyclic carbon chain having a number of carbon atoms which corresponds to this stated range and which contains one triple bond which can be located in any position of the respective unsaturated radical. "($C_2$-$C_6$)Alkynyl" accordingly denotes, for example, the propargyl, 1-methyl-2-propynyl, 2-butynyl or 3-butynyl group.

Cycloalkyl groups preferably have from three to seven carbon atoms in the ring and are optionally substituted by halogen or alkyl.

In compounds of formula (I) the following examples of radicals are provided:

An example of alkyl substituted by cycloalkyl is cyclopropylmethyl;

an example of alkyl substituted by alkoxy is methoxymethyl ($CH_3OCH_2$-); and

an example of alkyl substituted by alkylthio is methylthiomethyl ($CH_3SCH_2$-).

A heteroaromatic radical having 5 or 6 ring atoms and 1, 2 or 3 hetero atoms in the ring selected from the group consisting of N, O and S, preferably pyridyl, pyrimidinyl, pyridazinyl, pyrazinyl, triazinyl, thienyl, thiazolyl, thiadiazolyl, oxazolyl, isoxazolyl, furyl, pyrrolyl, pyrazolyl, imidazolyl or triazolyl.

The term pests means arthropod pests (including insects and arachnids), and helminths (including nematodes). The term parasites embraces all pests that live in or on animals.

In the following preferred definitions it is generally to be understood that where symbols are not specifically defined they are to be as previously defined in the description.

Preferably $R^1$ is $CSNH_2$ or C(=N-Z)-S-Q, wherein Q is $(C_1-C_3)$-alkyl and Z is H, $(C_1-C_3)$-alkyl, $-(CH_2)_qR^7$, $COR^8$, $CO_2-(C_1-C_3)$-alkyl, $S(O)_pR^8$, $CO_2-CH_2R^7$, $CO_2-(C_3-C_6)$-alkenyl or $CO_2-(C_3-C_6)$-alkynyl, in which each $R^7$ is independently phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkyl, $(C_1-C_3)$-haloalkyl, $(C_1-C_3)$-alkoxy, CN and $NO_2$, and each $R^8$ is independently $(C_1-C_3)$-alkyl.

More preferably $R^1$ is $CSNH_2$ or C(=N-Z)-S-Q, wherein Z is H and Q is $(C_1-C_3)$-alkyl (most preferably $R^1$ is $CSNH_2$).

Preferably W is C-Cl or N (more preferably W is C-Cl).

Preferably $R^2$ is Cl.

Preferably $R^3$ is $CF_3$ or $OCF_3$ (more preferably $R^3$ is $CF_3$).

Preferably $R^4$ is $(C_2-C_4)$-alkenyl, $(C_2-C_4)$-haloalkenyl, $(C_2-C_4)$-alkynyl, $(C_2-C_4)$-haloalkynyl, $(C_3-C_7)$-cycloalkyl, $(C_3-C_7)$-cycloalkyl-$(C_1-C_3)$-alkyl, $CO_2-(C_3-C_4)$-alkenyl, $CO_2-(C_3-C_4)$-alkynyl, $-CO_2-(CH_2)_q-R^7$, $-CH_2R^7$, $OR^7$, $OR^8$, $COCO_2R^{10}$ or $COCONR^{10}R^{11}$; or $CO_2-(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy and $(C_1-C_3)$-alkylthio; or $(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, $(C_3-C_7)$-cycloalkyl, $S(O)_pR^8$ and $CO_2-(C_1-C_3)$-alkyl, wherein each $R^7$ is independently phenyl unsubstituted or substituted by one or more radicals selected from the group

consisting of halogen, $(C_1-C_3)$-alkyl, $(C_1-C_3)$-haloalkyl, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, CN, $NO_2$ and $S(O)_pR^8$, each $R^8$ is independently $(C_1-C_3)$-alkyl or $(C_1-C_3)$-haloalkyl, and $R^{10}$ and $R^{11}$ are independently H or $(C_1-C_3)$-alkyl.

More preferably $R^4$ is $CO_2$-$(C_1-C_3)$-alkyl, $CO_2$-$(C_3-C_4)$-alkenyl, $CO_2$-$(C_3-C_4)$-alkynyl or $-CO_2-(CH_2)_q-R^7$, wherein $R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkyl, $(C_1-C_3)$-haloalkyl and $(C_1-C_3)$-alkoxy; or $(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy, $S(O)_pR^8$ and $CO_2$-$(C_1-C_3)$-alkyl.

Most preferably $R^4$ is $CO_2$-$(C_1-C_3)$-alkyl or $(C_1-C_3)$-alkyl.

Preferably A is $(C_1-C_4)$-alkylene. More preferably A is $-CH_2CH_2-$ or $-CH_2CH_2CH_2-$.

Preferably $R^5$ is $(C_3-C_6)$-cycloalkyl or $-(CH_2)_qR^7$; or $(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, $(C_3-C_6)$-cycloalkyl, $S(O)_pR^8$ and $CO_2$-$(C_1-C_3)$-alkyl, wherein $R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkyl, $(C_1-C_3)$-haloalkyl, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, CN, $NO_2$ and $S(O)_pR^8$, and $R^8$ is $(C_1-C_3)$-alkyl or $(C_1-C_3)$-haloalkyl.

More preferably $R^5$ is $(C_1-C_3)$-alkyl or $(C_1-C_3)$-haloalkyl.

Preferably $R^6$ and X are each independently F or Cl.

More preferably $R^6$ and X are both F.

A preferred class of compounds of formula (I) are those wherein:

$R^1$ is $CSNH_2$ or C(=N-Z)-S-Q, wherein Z is H, $(C_1-C_3)$-alkyl, $-(CH_2)_qR^7$, $COR^8$, $CO_2$-$(C_1-C_3)$-alkyl, $S(O)_pR^8$, $CO_2$-$CH_2R^7$, $CO_2$-$(C_3-C_6)$-alkenyl or $CO_2$-$(C_3-C_6)$-alkynyl, each $R^7$ is independently phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkyl, $(C_1-C_3)$-haloalkyl, $(C_1-C_3)$-alkoxy, CN and $NO_2$, and each $R^8$ is independently $(C_1-C_3)$-alkyl;

W is C-Cl or N;

$R^2$ is Cl;

$R^3$ is $CF_3$ or $OCF_3$;

Q is $(C_1-C_3)$-alkyl;

$R^4$ is $(C_2-C_4)$-alkenyl, $(C_2-C_4)$-haloalkenyl, $(C_2-C_4)$-alkynyl, $(C_2-C_4)$-haloalkynyl, $(C_3-C_7)$-cycloalkyl, $(C_3-C_7)$-cycloalkyl-$(C_1-C_3)$-alkyl, $CO_2$-$(C_3-C_4)$-alkenyl, $CO_2$-$(C_3-C_4)$-alkynyl, $-CO_2-(CH_2)_q-R^7$, $-CH_2R^7$, $OR^7$, $OR^8$, $COCO_2R^{10}$ or $COCONR^{10}R^{11}$; or $CO_2$-$(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy and $(C_1-C_3)$-alkylthio; or $(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, $(C_3-C_7)$-cycloalkyl, $S(O)_pR^8$ and $CO_2$-$(C_1-C_3)$-alkyl, wherein each $R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkyl, $(C_1-C_3)$-haloalkyl, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, CN, $NO_2$ and $S(O)_pR^8$, and each $R^8$ is $(C_1-C_3)$-alkyl or $(C_1-C_3)$-haloalkyl;

A is $(C_1-C_4)$-alkylene or $(C_1-C_4)$-haloalkylene;

$R^5$ is $(C_3-C_6)$-cycloalkyl or $-(CH_2)_qR^7$; or $(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, $(C_3-C_6)$-cycloalkyl, $S(O)_pR^8$ and $CO_2$-$(C_1-C_3)$-alkyl, wherein $R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkyl, $(C_1-C_3)$-haloalkyl, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, CN, $NO_2$ and $S(O)_pR^8$, and $R^8$ is $(C_1-C_3)$-alkyl or $(C_1-C_3)$-haloalkyl;

X is F or Cl;

$R^6$ is F or Cl;

$R^{10}$ and $R^{11}$ are independently H or $(C_1-C_3)$-alkyl;

m, n and p are each independently zero, one or two; and

q is zero or one.

A further preferred class of compounds of formula (I) are those wherein:

$R^1$ is $CSNH_2$ or C(=NH)-S-Q;

W is C-Cl;

$R^2$ is Cl;

$R^3$ is $CF_3$ or $OCF_3$ (more preferably $CF_3$);

Q is $(C_1\text{-}C_3)$-alkyl;

$R^4$ is $(C_2\text{-}C_4)$-alkenyl, $(C_2\text{-}C_4)$-alkynyl, $(C_3\text{-}C_7)$-cycloalkyl, $CO_2\text{-}(C_1\text{-}C_3)$-alkyl, $CO_2\text{-}(C_3\text{-}C_4)$-alkenyl, $CO_2\text{-}(C_3\text{-}C_4)$-alkynyl or $\text{-}CO_2\text{-}(CH_2)_q\text{-}R^7$; or $(C_1\text{-}C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1\text{-}C_3)$-alkoxy, $(C_1\text{-}C_3)$-haloalkoxy, $(C_3\text{-}C_7)$-cycloalkyl, $S(O)_pR^8$ and $CO_2\text{-}(C_1\text{-}C_3)$-alkyl;

A is $(C_1\text{-}C_4)$-alkylene or $(C_1\text{-}C_4)$-haloalkylene;

$R^5$ is $(C_3\text{-}C_6)$-cycloalkyl or $\text{-}(CH_2)_qR^7$; or $(C_1\text{-}C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1\text{-}C_3)$-alkoxy, $(C_1\text{-}C_3)$-haloalkoxy, $(C_3\text{-}C_6)$-cycloalkyl, $S(O)_pR^8$ and $CO_2\text{-}(C_1\text{-}C_3)$-alkyl;

X is F or Cl;

$R^6$ is F or Cl;

$R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1\text{-}C_3)$-alkyl, $(C_1\text{-}C_3)$-haloalkyl, $(C_1\text{-}C_3)$-alkoxy, $(C_1\text{-}C_3)$-haloalkoxy, CN, $NO_2$, $S(O)_pR^8$, $CO_2\text{-}(C_1\text{-}C_3)$-alkyl, $COR^8$, $NR^{12}R^{13}$ and OH;

$R^8$ is $(C_1\text{-}C_3)$-alkyl or $(C_1\text{-}C_3)$-haloalkyl;

$R^{12}$ and $R^{13}$ are each independently H or $(C_1\text{-}C_3)$-alkyl;

m, n and p are each independently zero, one or two; and

q is zero or one.

A further preferred class of compounds of formula (I) are those wherein:

$R^1$ is $CSNH_2$ or $C(=NH)\text{-}S\text{-}Q$;

W is C-Cl;

$R^2$ is Cl;

$R^3$ is $CF_3$ or $OCF_3$ (more preferably $CF_3$);

Q is $(C_1\text{-}C_3)$-alkyl;

$R^4$ is $CO_2\text{-}(C_1\text{-}C_3)$-alkyl, $CO_2\text{-}(C_3\text{-}C_4)$-alkenyl, $CO_2\text{-}(C_3\text{-}C_4)$-alkynyl or $\text{-}CO_2\text{-}(CH_2)_q\text{-}R^7$; or $(C_1\text{-}C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1\text{-}C_3)$-alkoxy, $S(O)_pR^8$ and $CO_2\text{-}(C_1\text{-}C_3)$-alkyl;

A is $(C_1\text{-}C_4)$-alkylene;

$R^5$ is $(C_3$-$C_6)$-cycloalkyl or $-(CH_2)_qR^7$; or $(C_1$-$C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1$-$C_3)$-alkoxy, $(C_1$-$C_3)$-haloalkoxy, $(C_3$-$C_6)$-cycloalkyl, $S(O)_pR^8$ and $CO_2$-$(C_1$-$C_3)$-alkyl;
X is F or Cl;
$R^6$ is F or Cl;
$R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1$-$C_3)$-alkyl, $(C_1$-$C_3)$-haloalkyl, $(C_1$-$C_3)$-alkoxy, $(C_1$-$C_3)$-haloalkoxy, CN, $NO_2$, $S(O)_pR^8$, $CO_2$-$(C_1$-$C_3)$-alkyl, $COR^8$, $NR^{12}R^{13}$ and OH;
$R^8$ is $(C_1$-$C_3)$-alkyl or $(C_1$-$C_3)$-haloalkyl;
$R^{12}$ and $R^{13}$ are each independently H or $(C_1$-$C_3)$-alkyl;
m, n and p are each independently zero, one or two; and
q is zero or one.

A further preferred class of compounds of formula (I) are those wherein:
$R^1$ is $CSNH_2$ or C(=NH)-S-Q;
W is C-Cl;
$R^2$ is Cl;
$R^3$ is $CF_3$ or $OCF_3$ (more preferably $CF_3$);
Q is $(C_1$-$C_3)$-alkyl;
$R^4$ is $(C_2$-$C_4)$-alkenyl, $(C_2$-$C_4)$-alkynyl, $(C_3$-$C_7)$-cycloalkyl, $CO_2$-$(C_1$-$C_3)$-alkyl, $CO_2$-$(C_3$-$C_4)$-alkenyl, $CO_2$-$(C_3$-$C_4)$-alkynyl or $-CO_2$-$(CH_2)_q$-$R^7$; or $(C_1$-$C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1$-$C_3)$-alkoxy, $(C_1$-$C_3)$-haloalkoxy, $(C_3$-$C_7)$-cycloalkyl, $S(O)_pR^8$ and $CO_2$-$(C_1$-$C_3)$-alkyl;
A is $(C_1$-$C_4)$-alkylene;
$R^5$ is $(C_1$-$C_3)$-alkyl or $(C_1$-$C_3)$-haloalkyl;
X is F or Cl;
$R^6$ is F or Cl;
$R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1$-$C_3)$-alkyl, $(C_1$-$C_3)$-haloalkyl, $(C_1$-$C_3)$-alkoxy, $(C_1$-$C_3)$-haloalkoxy, CN, $NO_2$, $S(O)_pR^8$, $CO_2$-$(C_1$-$C_3)$-alkyl, $COR^8$, $NR^{12}R^{13}$ and OH;
$R^8$ is $(C_1$-$C_3)$-alkyl or $(C_1$-$C_3)$-haloalkyl;

$R^{12}$ and $R^{13}$ are each independently H or $(C_1$-$C_3)$-alkyl;
m, n and p are each independently zero, one or two; and
q is zero or one.

A further preferred class of compounds of formula (I) are those wherein:
$R^1$ is $CSNH_2$ or C(=NH)-S-Q;
W is C-Cl;
$R^2$ is Cl;
$R^3$ is $CF_3$ or $OCF_3$ (more preferably $CF_3$);
Q is $(C_1$-$C_3)$-alkyl;
$R^4$ is $CO_2$-$(C_1$-$C_3)$-alkyl, $CO_2$-$(C_3$-$C_4)$-alkenyl, $CO_2$-$(C_3$-$C_4)$-alkynyl or -$CO_2$-$(CH_2)_q$-$R^7$; or $(C_1$-$C_3)$-alkyl;
A is $(C_1$-$C_4)$-alkylene;
$R^5$ is $(C_3$-$C_6)$-cycloalkyl or –$(CH_2)_qR^7$; or $(C_1$-$C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1$-$C_3)$-alkoxy, $(C_1$-$C_3)$-haloalkoxy, $(C_3$-$C_6)$-cycloalkyl, $S(O)_pR^8$ and $CO_2$-$(C_1$-$C_3)$-alkyl;
X is F or Cl;
$R^6$ is F or Cl;
$R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1$-$C_3)$-alkyl, $(C_1$-$C_3)$-haloalkyl, $(C_1$-$C_3)$-alkoxy, $(C_1$-$C_3)$-haloalkoxy, CN, $NO_2$ and $S(O)_pR^8$;
$R^8$ is $(C_1$-$C_3)$-alkyl or $(C_1$-$C_3)$-haloalkyl;
m, n and p are each independently zero, one or two; and
q is zero or one.

A further preferred class of compounds of formula (I) are those wherein:
$R^1$ is $CSNH_2$;
W is C-Cl;
$R^2$ is Cl;
$R^3$ is $CF_3$ or $OCF_3$ (more preferably $CF_3$);
$R^4$ is $(C_2$-$C_4)$-alkenyl, $(C_2$-$C_4)$-alkynyl, $(C_3$-$C_7)$-cycloalkyl or $CO_2$-$(C_1$-$C_3)$-alkyl, $CO_2$-$(C_3$-$C_4)$-alkenyl, $CO_2$-$(C_3$-$C_4)$-alkynyl or -$CO_2$-$(CH_2)_q$-$R^7$; or $(C_1$-$C_3)$-alkyl

unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_2)$-alkoxy, $(C_1-C_2)$-haloalkoxy, $(C_3-C_7)$-cycloalkyl, $S(O)_pR^8$ and $CO_2-(C_1-C_2)$-alkyl;

A is $(C_1-C_4)$-alkylene;

$R^5$ is $(C_1-C_3)$-alkyl or $(C_1-C_3)$-haloalkyl;

X is F or Cl;

$R^6$ is F or Cl;

$R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_2)$-alkyl, $(C_1-C_2)$-haloalkyl, $(C_1-C_2)$-alkoxy, CN and $NO_2$;

$R^8$ is $(C_1-C_2)$-alkyl or $(C_1-C_2)$-haloalkyl;

m, n and p are each independently zero, one or two; and

q is zero or one.

A further preferred class of compounds of formula (I) are those wherein:

$R^1$ is $CSNH_2$;

W is C-Cl;

$R^2$ is Cl;

$R^3$ is $CF_3$;

$R^4$ is $CO_2-(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy and $(C_1-C_3)$-alkylthio; or $CO_2-(C_3-C_4)$-alkenyl, $CO_2-(C_3-C_4)$-alkynyl or $-CO_2-(CH_2)_q-R^7$; or $(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, methoxy, ethoxy and methylthio;

A is $-CH_2CH_2-$ or $-CH_2CH_2CH_2-$;

$R^5$ is $(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, methoxy and methylthio;

X is F;

$R^6$ is F;

$R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_2)$-alkyl, $(C_1-C_2)$-alkoxy and $NO_2$;

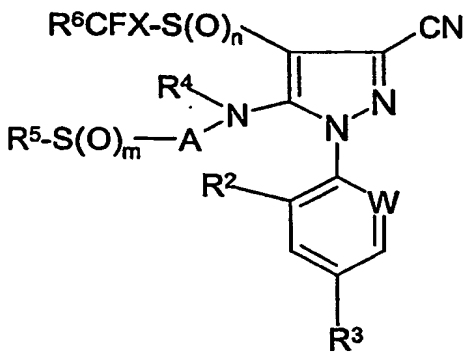
m and n are each independently zero, one or two; and

q is zero or one.

A further preferred class of compounds of formula (I) are those wherein:
$R^1$ is C(=NH)-S-Q;
W is C-Cl;
$R^2$ is Cl;
$R^3$ is $CF_3$;
Q is $(C_1$-$C_3)$-alkyl;
$R^4$ is $(C_1$-$C_3)$-alkyl;
A is $-CH_2CH_2-$ or $-CH_2CH_2CH_2-$;
$R^5$ is $(C_1$-$C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, methoxy and methylthio;
X is F;
$R^6$ is F; and
m and n are each independently zero, one or two.

The compounds of general formula (I) can be prepared by the application or adaptation of known methods (i.e. methods heretofore used or described in the chemical literature.
In the following description of processes when symbols appearing in formulae are not specifically defined, it is understood that they are "as defined above" in accordance with the first definition of each symbol in the specification.

According to a feature of the invention compounds of formula (I) wherein $R^1$ is $CSNH_2$, and $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, W, A, X, m and n are as defined above, may be prepared by the reaction of the corresponding compound of formula (II):



(II)

wherein $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, W, A, X, m and n are as defined above, with an alkali or alkaline earth metal hydrosulfide, such as lithium, potassium, calcium or preferably sodium hydrosulfide, in an inert solvent for example N,N-dimethylformamide, pyridine, dioxan, tetrahydrofuran, sulfolane, dimethyl sulfoxide, methanol or ethanol at a temperature from -35°C to 50°C preferably 0°C to 30°C. Optionally the hydrosulfide may be generated in situ by treatment with $H_2S$ in the presence of an organic base, such as a metal alkoxide or trialkylamine or an inorganic base, such as an alkaline or alkaline earth metal hydroxide or a carbonate, such as sodium, potassium or ammonium carbonate. The use of a metal complexing agent, such as a crown ether, can be of benefit in accelerating the reaction. The reaction of hydrosulfide salt with the compound of formula (II) can also be conducted in a two-phase water/organic solvent system using a phase transfer catalyst such as a crown ether or a tetraalkylammonium salt such as tetra-n-butylammonium bromide or benzyltrimethylammonium chloride. Organic solvents suitable for use in a two-phase system with water include benzene, toluene, dichloromethane, 1-chlorobutane and methyl tertiary-butyl ether.

Alternatively compounds of formula (I) may also be prepared from compounds of formula (II) by treatment with the reagent $Ph_2PS_2$, as described in Tet. Lett., 24 (20), 2059 (1983).

According to a further feature of the invention compounds of formula (I) wherein $R^1$ is $CSNH_2$, and $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, W, A, X, m and n are as defined above, may be prepared by the reaction of the corresponding compound of formula (II) as defined above with a bis(trialkylsilyl)sulfide, preferably bis(trimethylsilyl)sulfide, in the

presence of a base generally an alkali metal alkoxide such as sodium methoxide, in a solvent such as N,N-dimethylformamide, at a temperature of from 0°C to 60°C. The procedure is generally described by Lin, Ku and Shiao in Synthesis 1219 (1992).

According to a further feature of the invention compounds of formula (I) wherein $R^1$ is C(=NH)-S-Q, and Q, $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, W, A, X, m and n are as defined above, may be prepared by the reaction of the corresponding compound of formula (I) wherein $R^1$ is $CSNH_2$ with an alkylating agent of formula (III) or (IV):

Q-L (III) $Q_3O^+BF_4^-$ (IV)

wherein Q is as defined above and L is a leaving group, generally halogen and preferably chlorine, bromine or iodine. The reaction is generally performed in the presence of a base, for example an alkali metal hydride such as sodium hydride, or an alkali metal alkoxide such as potassium tert-butoxide, in an inert solvent such as tetrahydrofuran at a temperature from 0 to 60°C. Alternatively an alkali metal carbonate such as potassium carbonate, or an organic base such as a trialkylamine, for example triethylamine or N,N-diisopropylethylamine may be used, in an inert solvent such as acetone, at a temperature from 0°C to the reflux temperature of the solvent. When a compound of formula (IV) such as trimethyloxonium tetrafluoroborate is used as the alkylating agent, the base is preferably an alkali metal bicarbonate such as sodium bicarbonate, the solvent is for example dichloromethane, and the temperature is from 0°C to the reflux temperature of the solvent.

According to a further feature of the present invention compounds of formula (I) wherein $R^1$ is C(=N-Z)-S-Q, Z is as defined above with the exclusion of H, and the other values are as defined in formula (I), may be prepared by the alkylation, acylation or sulfonylation of the corresponding compound of formula (I) wherein Z is H, with a compound of formula (V):

$Z\text{-}L^1$ (V)

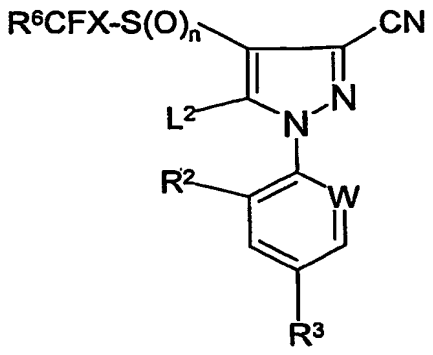
wherein Z is as defined above with the exclusion of H, and $L^1$ is a leaving group.

For alkylations, where Z is $(C_1\text{-}C_6)$-alkyl, $(C_1\text{-}C_6)$-haloalkyl, $(C_3\text{-}C_6)$-alkenyl, $(C_3\text{-}C_6)$-alkynyl or $-(CH_2)_qR^7$, $L^1$ is preferably halogen, alkylsulfonyloxy or arylsulfonyloxy (more preferably chlorine, bromine, iodine, methylsulfonyloxy or p-toluenesulfonyloxy). A base is optionally present in the reaction which is generally performed in an inert solvent such as tetrahydrofuran, dioxan, acetonitrile, toluene, diethyl ether, dichloromethane; dimethylsulfoxide or N,N-dimethylformamide, at a temperature of from -30°C to 200°C, preferably at 20°C to 100°C. The base is generally an alkali metal hydroxide such as potassium hydroxide, an alkali metal hydride such as sodium hydride, an alkali metal carbonate such as potassium carbonate or sodium carbonate, an alkali metal alkoxide such as sodium methoxide, an alkaline earth metal carbonate such as calcium carbonate, or an organic base such as a tertiary amine, for example triethylamine or ethyldiisopropylamine, or pyridine, or 1,8-diazabicyclo[5.4.0]undec-7-en (DBU).

For acylations, where Z is $COR^8$, $CO_2\text{-}(C_1\text{-}C_6)$-alkyl, $CO_2\text{-}CH_2R^7$, $CO_2\text{-}(C_3\text{-}C_6)$-alkenyl or $CO_2\text{-}(C_3\text{-}C_6)$-alkynyl , (V) is preferably an acid halide where $L^1$ is preferably chlorine or bromine (more preferably chlorine), or an acid anhydride where $L^1$ is $R^8\text{-}CO_2\text{-}$. A base is optionally present in the reaction, which is generally performed using similar bases, solvents and temperatures as employed for the alkylations.

For sulfonylations, where Z is $S(O)_pR^8$, (V) is preferably a sulfonyl halide where $L^1$ is preferably chlorine or bromine (more preferably chlorine). A base is optionally present in the reaction, which is generally performed using similar bases, solvents and temperatures as employed for the alkylations.

Intermediate compounds of formula (II) wherein $R^2$, $R^3$, $R^5$, $R^6$, W, A, X, m and n are as defined above, and $R^4$ is H, may be prepared by the reaction of a compound of formula (VI):



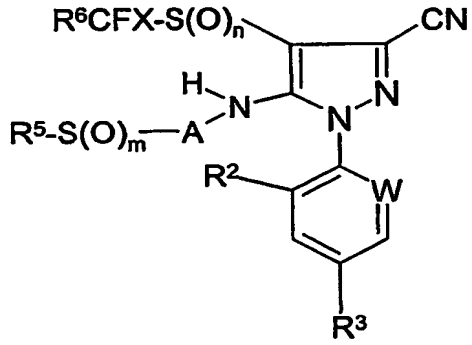
(VI)

wherein $R^2$, $R^3$, $R^6$, W, X and n are as defined above and $L^2$ is a leaving group, generally halogen and preferably bromine, with a compound of formula (VII):

$$R^5\text{-}S(O)_m\text{—}A\text{—}NH_2 \qquad \text{(VII)}$$

wherein A and m are as defined above and $R^5$ is as defined above. The reaction is generally performed in the presence of a base such an alkali metal carbonate, for example potassium carbonate, in a solvent such as dioxan, tetrahydrofuran or N,N-dimethylformamide, at a temperature of from 0° to 100°C (preferably 0° to 50°C).

Intermediate compounds of formula (II) wherein $R^2$, $R^3$, $R^5$, W, A, X, m and n are as defined above and $R^4$ is as defined above with the exclusion of H, $OR^7$ or $OR^8$, may be prepared by the alkylation or acylation of a corresponding compound of formula (VIII):



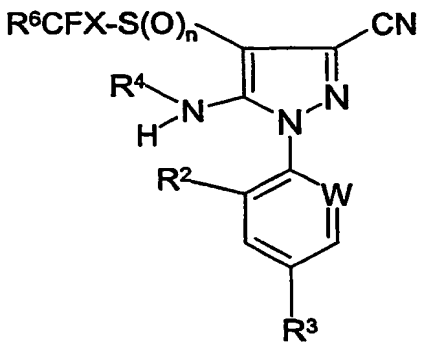
(VIII)

wherein $R^2$, $R^3$, $R^5$, $R^6$, W, A, X, m and n are as defined above, with a compound of formula (IX):

$R^4$-$L^3$ (IX)

wherein $R^4$ is as defined above with the exclusion of H, $OR^7$ or $OR^8$, and $L^3$ is a leaving group, generally halogen and preferably chlorine or iodine. Alkylation reactions are generally performed in the presence of a base such as sodium hydride, in a solvent such as dioxan, tetrahydrofuran or N,N-dimethylformamide, at a temperature of from 0° to 100°C (preferably 0° to 50°C). Acylation reactions, where $R^4$ is $CO_2$-($C_3$-$C_6$)-alkenyl, $CO_2$-($C_3$-$C_6$)-alkynyl, -$CO_2$-$(CH_2)_q$-$R^7$, $COCO_2R^{10}$ or $COCONR^{10}R^{11}$; or $CO_2$-($C_1$-$C_3$)-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, ($C_1$-$C_3$)-alkoxy and ($C_1$-$C_3$)-alkylthio, and $L^3$ is preferably chlorine, are generally performed using similar bases, solvents and temperatures as employed for the alkylations.

Intermediate compounds of formula (II) wherein $R^2$, $R^3$, $R^5$, $R^6$, W, A, X, m and n are as defined above, and $R^4$ is as defined above with the exclusion of H; may also be prepared by the reaction of a compound of formula (X):



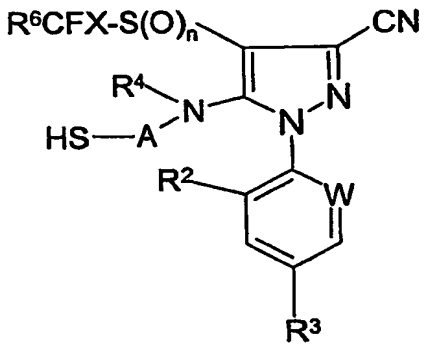

(X)

wherein $R^2$, $R^3$, $R^4$, $R^6$, W, X and n are as defined above, with a compound of formula (XI):

$R^5$-$S(O)_m$-A-$L^4$ (XI)

wherein $R^5$, A and m are as defined above and $L^4$ is a leaving group, generally halogen and preferably chlorine. The reaction is generally performed in the presence of a base such sodium hydride, in a solvent such as dioxan, tetrahydrofuran or N,N-dimethylformamide, at a temperature of from 0° to 100°C (preferably 0° to 50°C).

Intermediate compounds of formula (II) wherein $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, W, A, X and n are as defined above, and m is 0, may be prepared by the reaction of a compound of formula (XII):



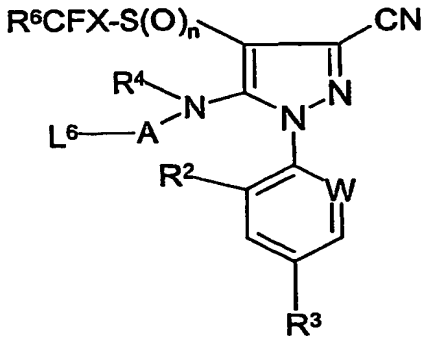
(XII)

wherein $R^2$, $R^3$, $R^4$, $R^6$, W, A, X and n are as defined above, with a compound of formula (XIII):

$$R^5\text{-}L^5 \qquad \text{(XIII)}$$

wherein $R^5$ is as defined above and $L^5$ is a leaving group, generally a halogen for example chlorine or an alkylsulphonyloxy group. The reaction is generally performed using an alkali metal salt, for example the sodium salt, of the compound of formula (XII), in an inert solvent such as tetrahydrofuran at a temperature from 0 to 60°C.

Intermediate compounds of formula (II) wherein $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, W, A, X and n are as defined above, and m is 0, may also be prepared by the reaction of a compound of formula (XIV):



(XIV)

wherein $R^2$, $R^3$, $R^4$, $R^6$, W, A, X and n are as defined above and $L^6$ is a leaving group, generally a halogen for example chlorine or an alkylsulphonyloxy group, with a compound of formula (XV):

$$R^5\text{-S-H} \qquad \text{(XV)}$$

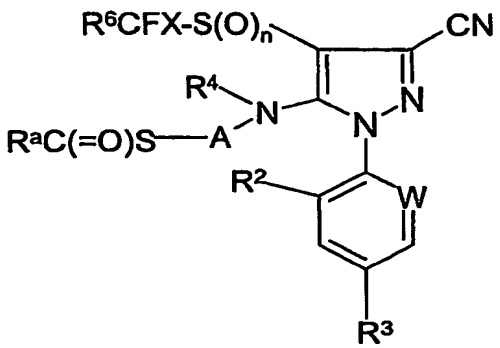
wherein $R^5$ is as defined above. The reaction is generally performed in the presence of a base, for example an alkali metal hydride such as sodium hydride, or an alkali metal alkoxide such as potassium tert-butoxide, in an inert solvent such as tetrahydrofuran at a temperature from 0 to 60°C, or an alkali metal carbonate such as potassium carbonate, in an inert solvent such as acetone, at a temperature from 0°C to the reflux temperature of the solvent.

Intermediate compounds of formula (II) wherein $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, W, A and X are as defined above, and m and/or n is 1 or 2, may be prepared by oxidising a corresponding compound in which m and/or n is 0 or 1. The oxidation is generally performed using a a mild oxidising agent (to prevent destruction of the thioamide functional group) such as sodium periodate in an inert solvent for example methylene chloride at a temperature from -40°C to the reflux temperature of the solvent.

Intermediates compounds of formula (XII) wherein $R^2$, $R^3$, $R^4$, $R^6$, W, A, X and n are as defined above may be prepared by the reaction of the corresponding compound of formula (XIV) as defined above, with a compound of formula (XVI):

$$R^a\text{-C(=S)SH} \qquad \text{(XVI)}$$

wherein $R^a$ is $(C_1\text{-}C_6)$-alkyl, to give a compound of formula (XVII):



(XVII)

wherein the various symbols are as defined above. The reaction is generally performed in the presence of a base such as an alkali metal hydride for example sodium hydride, an alkali metal alkoxide such as sodium ethoxide, or triethylamine, in a solvent such as dioxan, tetrahydrofuran or N,N-dimethylformamide, at a temperature of from 0° to 100°C. The compound of formula (XVII) is then hydrolysed to give the corresponding compound of formula (XII). The hydrolysis is generally carried out using a base such as aqueous ammonia or an alkali metal hydroxide such as sodium hydroxide, generally in the presence of a co-solvent such as an alcohol for example ethanol, at a temperature of from 0° to 100°C. Alternatively the hydrolysis may be performed in situ without isolation of (XVII).

Collections of compounds of the formula (I) which can be synthesized by the above mentioned process may also be prepared in a parallel manner, and this may be effected manually or in a semiautomated or fully automated manner. In this case, it is possible, for example, to automate the procedure of the reaction, work-up or purification of the products or of the intermediates. In total, this is to be understood as meaning a procedure as is described, for example, by S.H. DeWitt in "Annual Reports in Combinatorial Chemistry and Molecular Diversity: Automated Synthesis", Volume 1, Verlag Escom 1997, pages 69 to 77.

A series of commercially available apparatuses as are offered by, for example, Stem Corporation, Woodrolfe Road, Tollesbury, Essex, CM9 8SE, England or H+P Labortechnik GmbH, Bruckmannring 28, 85764 Oberschleißheim, Germany or Radleys, Shirehill, Saffron Walden, Essex, England, may be used for the parallel procedure of the reaction and work-up. For the parallel purification of compounds of the formula (I), or of intermediates obtained during the preparation, use may be made, inter alia, of chromatography apparatuses, for example those by ISCO, Inc., 4700 Superior Street, Lincoln, NE 68504, USA.

The apparatuses mentioned lead to a modular procedure in which the individual process steps are automated, but manual operations must be performed between

the process steps. This can be prevented by employing semi-integrated or fully integrated automation systems where the automation modules in question are operated by, for example, robots. Such automation systems can be obtained, for example, from Zymark Corporation, Zymark Center, Hopkinton, MA 01748, USA.

In addition to what has been described here, compounds of the formula (I) may be prepared in part or fully by solid-phase-supported methods. For this purpose, individual intermediate steps or all intermediate steps of the synthesis or of a synthesis adapted to suit the procedure in question are bound to a synthetic resin. Solid-phase-supported synthesis methods are described extensively in the specialist literature, for example Barry A. Bunin in "The Combinatorial Index", Academic Press, 1998.

The use of solid-phase-supported synthesis methods permits a series of protocols which are known from the literature and which, in turn, can be performed manually or in an automated manner. For example, the "tea-bag method" (Houghten, US 4,631,211; Houghten et al., Proc. Natl. Acad. Sci, 1985, 82, 5131-5135), in which products by IRORI, 11149 North Torrey Pines Road, La Jolla, CA 92037, USA, are employed, may be semiautomated. The automation of solid-phase-supported parallel syntheses is performed successfully, for example, by apparatuses by Argonaut Technologies, Inc., 887 Industrial Road, San Carlos, CA 94070, USA or MultiSynTech GmbH, Wullener Feld 4, 58454 Witten, Germany.

The preparation of the processes described herein yields compounds of the formula (I) in the form of substance collections which are termed libraries. The present invention also relates to libraries which comprise at least two compounds of the formula (I).

Intermediates of formula (VI) wherein $L^2$ is chlorine, bromine or iodine may be prepared according to known procedures, for example as described in EP 0295117, by the diazotisation of the corresponding amine of formula (IX) wherein $R^4$ is H, generally using an alkyl nitrite such as t-butyl nitrite, in the presence of a suitable halogenating agent, preferably bromoform, iodine or anhydrous cupric chloride,

optionally in the presence of a solvent such as acetonitrile or chloroform, at a temperature of from 0° to 100°C.

Intermediates of formula (VIII) (also of formula (II) wherein $R^4$ is H) may be prepared according to the above process for the preparation of compounds of formula (II) by the reaction of compounds of formula (VI) with compounds of formula (VII).

Some of the intermediates of formula (VIII) are included in the definition of formula (II) and may be prepared by the above-mentioned methods, whilst other compounds of formula (VIII) are known or may be prepared by known methods.

Compounds of formula (III), (IV), (V), (VI), (VII), (IX), (X), (XI), (XIII), (XIV) and (XV) are known or may be prepared by known methods.

Chemical Examples

The following non-limiting Examples illustrate the preparation of the compounds of formula (I).

NMR spectra were run in deuterochloroform unless stated otherwise and chemical shifts are given in ppm.

Example 1
1-(2,6-Dichloro-4-trifluoromethylphenyl)-5-N-methyl-N-(2-methylthioethyl)amino-4-trifluoromethylthiopyrazole-3-thiocarboxamide

Bis(trimethylsilyl)sulfide (0.526 g, 2.9 mmol) and sodium methoxide (0.164 g, 2.9 mmol) were added to N,N-dimethylformamide (3 ml). The above mixture was sonicated to afford a dark blue solution. This resulting solution was added dropwise to 3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-5-N-methyl-N-(2-methylthioethyl)amino-4-trifluoromethylthiopyrazole (0.3 g, 0.6 mmol) in N,N-dimethylformamide (4 ml), then stirred at 20°C for two hours. The reaction mixture

was poured into ether and water. The layers were separated and the organic layer was washed with water, dried (sodium sulfate), and concentrated to give a yellow solid (0.34 g). Purification by chromatography on silica gel eluting with heptane/ethyl acetate (9:1 to 4:1) gave the title compound as a yellow solid (0.273 g, Compound 1-1, 82 % yield), mp 120°C, 19F-NMR: -44.5, -63.6.

By proceeding in a similar manner the following compounds were also prepared:
1-(2,6-dichloro-4-trifluoromethylphenyl)-5-N-methyl-N-(2-methylsulfonylethyl)amino-4-trifluoromethylsulfonylpyrazole-3-thiocarboxamide (Compound 1-9), 19F-NMR: -63.7, -74.6; and
1-(2,6-dichloro-4-trifluoromethylphenyl)- 5-N-methyl-N-(2-methylsulfinylethyl)amino-4-trifluoromethylthiopyrazole-3-thiocarboxamide (Compound 1-2), 19 F: -44.6, -64.1.

Example 2

1-(2,6-Dichloro-4-trifluoromethylphenyl)-5-N-methyl-N-(2-methylthioethyl)amino-4-trifluoromethylthiopyrazole-
3-carboximidothioic acid ethyl ester

A solution of triethyloxonium tetrafluoroborate (0.04 g, 0.2 mmol) in dichloromethane was added to a solution of 1-(2,6-dichloro-4-trifluoromethylphenyl)-5-N-methyl-N-(2-methylthioethyl)amino-4-trifluoromethylthiopyrazole-3-thiocarboxamide (0.1 g, 0.2 mmol ) in dichloromethane at 20°C and stirred for 1 hour. The mixture was added to saturated sodium bicarbonate solution and ethyl acetate, and the organic layer dried (sodium sulfate) and evaporated to afford the title compound as a clear yellow oil (96.4 mg, Compound 8-1, 84 % yield), 19F-NMR: -45.0, -64.1.

By proceeding in a similar manner but starting from 1-(2,6-dichloro-4-trifluoromethylphenyl)-5-N-methyl-N-(2-methylsulfinylethyl)amino-4-trifluoromethylthiopyrazole-3-thiocarboxamide and trimethyloxonium tetrafluoroborate there was prepared:

1-(2,6-dichloro-4-trifluoromethylphenyl)-5-N-methyl-N-(2-methylsulfinylethyl)amino-4-trifluoromethylthiopyrazole-3-carboximidothioic acid methyl ester, as a clear oil (Compound 7-2, 85 % yield), 19F-NMR: -44.8, -64.1.

Example 3

1-(2,6-Dichloro-4-trifluoromethylphenyl)-5-N-methyl-N-(2-methylsulfonylethyl)amino-4-trifluoromethylsulfonylpyrazole-3-carboximidothioic acid methyl ester

Iodomethane (71 mg, 0.5 mmol) and N,N-diisopropylethylamine ( 32 mg, 0.2 mmol) were added to a solution of 1-(2,6-dichloro-4-trifluoromethylphenyl)-5-N-methyl-N-(2-methylsulfonylethyl)amino-4-trifluoromethylsulfonylpyrazole-3-thiocarboxamide (100 mg, 0.2 mmol) in acetone at 20°C. The resulting mixture was stirred for 2 hours, and then at 39°C for 2.5 hours. A further 1 equivalent each of iodomethane and N,N-diisopropylethylamine were added, and the resulting mixture stirred at 39°C for 3.5 hours. The mixture was then evaporated and purified via chromatographic purification eluting with heptane/ethyl acetate (4:1 to 2:1) to afford the title compound as a sticky solid (40 mg, Compound 7-9, 34 % yield), 19F-NMR: -63.8, -74.6, -78.6.

The following Intermediate Examples illustrate the preparation of intermediates used in the synthesis of the above Examples.

Intermediate Example 1

1-(2,6-Dichloro-4-trifluoromethylphenyl)-3-cyano-5-(2-methylthio)ethylamino-4-trifluoromethylsulfonylpyrazole

2-(Methylthio)ethylamine (37.12 g, 0.387 mol) and potassium carbonate (54 g, 0.387 mol) were added to a solution of 5-bromo-1-(2,6-dichloro-4-trifluoromethylphenyl)-3-cyano-4-trifluoromethylsulfonylpyrazole (100 g, 0.193mol) in 1,4-dioxan and N,N-dimethylformamide, and stirred at 20°C for 3.5 hours. The mixture was then added to water and ethyl acetate and the aqueous layer extracted with ethyl acetate. The combined organic phase was washed with water and brine, dried (sodium sulfate),

evaporated and chromatographed eluting with heptane/ethyl acetate (4:1) to afford the title compound as a semi solid (47.76 g, 47 % yield) which was used for the following reaction.

Intermediate Example 2

1-(2,6-Dichloro-4-trifluoromethylphenyl)-3-cyano-5-N-methyl-N-(2-methylthioethyl)amino-4-trifluoromethylsulfonylpyrazole

Sodium hydride (6.5 g, 0.163 mol) was added to a solution of 1-(2,6-dichloro-4-trifluoromethylphenyl)-3-cyano-5-(2-methylthio)ethylamino-4-trifluoromethylsulfonylpyrazole (66 g, 0.125 mol) in tetrahydrofuran, and stirred at 40°C for 1 hour. The mixture was cooled to 35°C, methyl iodide (35 g, 0.253 mol) added, and then stirred at 40°C for 2 hours. Additional methyl iodide (17.9 g, 0.126 mol) was then added and the mixture heated at 40°C for 1 hour. It was then cooled and poured into a mixture of saturated ammonium chloride solution and ethyl acetate. The organic layer was washed with water and brine, dried (sodium sulfate),and evaporated to give an orange oil. Recrystallisation from a mixture of heptane, ethyl acetate and methanol, with cooling in the freezer, gave the title compound as a light yellow solid (36.37 g, 54 % yield), mp 142°C.

Intermediate Example 3

1-(2,6-Dichloro-4-trifluoromethylphenyl)-3-cyano-5-N-methyl-N-(2-methylsulfonylethyl)amino-4-trifluoromethylsulfonylpyrazole

m-Chloroperbenzoic acid (33.6 g, 70 %, 0.136 mol) was added slowly to a solution of 1-(2,6-dichloro-4-trifluoromethylphenyl)-3-cyano-5-N-methyl-5-N-(2-methylthioethyl)amino-4-trifluoromethylsulfonylpyrazole (36 g, 0.0665 mol) in 1,2-dichloroethane, maintaining the reaction at 20°C. After 1hour the mixture was added to ethyl acetate and sodium hydroxide solution (2N) and stirred for five minutes. The organic layer was washed with water and brine, dried (sodium sulfate) and evaporated. The residue was triturated with heptane/ethyl acetate (4:1) and with

ethanol to afford the title compound as a light brown solid (34.19 g, 89 % yield), 19F-NMR: -63.7, -78.6.

By proceeding in a similar manner the following compound was also prepared:
1-(2,6-dichloro-4-trifluoromethylphenyl)-3-cyano-5-N-methyl-N-(2-methylsulfinylethyl)amino-4-trifluoromethylthiopyrazole, 19 F: -44.1, -63.7.

Intermediate Example 4

1-(2,6-dichloro-4-trifluoromethylphenyl)-3-cyano-5-N-methyl-N-(2-methylthioethyl)amino-4-trifluoromethylthiopyrazole.

2-Chloroethyl methylsulfide (1.887 g, 16.5 mmol) and potassium phosphate (9.052 g, 41.4 mmo) were added to a solution of 1-(2,6-dichloro-4-trifluoromethylphenyl)-3-cyano-5-N-methylamino-4-trifluoromethylthiopyrazole (6.0 g, 13.8 mmol) in acetonitrile. The mixture was heated under reflux for four hours, cooled and poured into saturated ammonium chloride solution and ethyl acetate. The organic layer was washed with water and brine, dried (sodium sulfate), and evaporated. The residue was purified by chromatography, eluting with heptane/ethyl acetate (4:1) to give the title compound as a yellow oil (5.48 g, 78 % yield), 19 F-NMR: -44.3, -63.6.

The following preferred compounds of formula (I) shown in Tables 1 to 9 also form part of the present invention, and were or may be prepared in accordance with, or analogously to, the above-mentioned Example 1 or the above-described general methods.
In the Tables, Me means methyl, Et means ethyl, Pr means n-propyl, OMe means methoxy, Ph means phenyl, $CO_2CH_2CCH$ means propargyloxycarbonyl and $CO_2CH_2$(2F Ph) means 2-fluorobenzyloxycarbonyl.
Compound numbers are given for reference purposes only.

Table 1: $R^1 = CSNH_2$, W = C-Cl, $R^2$ = Cl, $R^3 = CF_3$, $R^4$ = Me

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 1-1 | $CH_2CH_2$ | MeS | $CF_3S$ | 120 | -44.52, -63.63 |
| 1-2 | $CH_2CH_2$ | MeSO | $CF_3S$ | 68 | -44.57, -64.07 |
| 1-3 | $CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | -44.14, -63.64 |
| 1-4 | $CH_2CH_2$ | MeS | $CF_3SO$ | | -63.65, -65.73 |
| 1-5 | $CH_2CH_2$ | MeSO | $CF_3SO$ | | -64.10, -65.71, -66.09 |
| 1-6 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | 88 | -64.11, -66.00 |
| 1-7 | $CH_2CH_2$ | MeS | $CF_3SO_2$ | 150 | -63.68, -74.65 |
| 1-8 | $CH_2CH_2$ | MeSO | $CF_3SO_2$ | | -64.15, -74.96 |
| 1-9 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | -63.70, -74.59 |
| 1-10 | $CH_2CH_2CH_2$ | MeS | $CF_3S$ | | |
| 1-11 | $CH_2CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 1-12 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 1-13 | $CH_2CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 1-14 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 1-15 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 1-16 | $CH_2CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 1-17 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 1-18 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 1-19 | $CH_2CH_2$ | EtS | $CF_3S$ | | |
| 1-20 | $CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 1-21 | $CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 1-22 | $CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 1-23 | $CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 1-24 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 1-25 | $CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 1-26 | $CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 1-27 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 1-28 | $CH_2CH_2CH_2$ | EtS | $CF_3S$ | | |
| 1-29 | $CH_2CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 1-30 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 1-31 | $CH_2CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 1-32 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 1-33 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 1-34 | $CH_2CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 1-35 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 1-36 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |
| 1-37 | $CH_2CH_2$ | PrS | $CF_3S$ | | |
| 1-38 | $CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 1-39 | $CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 1-40 | $CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 1-41 | $CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 1-42 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 1-43 | $CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 1-44 | $CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 1-45 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 1-46 | $CH_2CH_2CH_2$ | PrS | $CF_3S$ | | |
| 1-47 | $CH_2CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 1-48 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 1-49 | $CH_2CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 1-50 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 1-51 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 1-52 | $CH_2CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 1-53 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 1-54 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 1-55 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 1-56 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 1-57 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 1-58 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 1-59 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 1-60 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 1-61 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 1-62 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 1-63 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 1-64 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 1-65 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |
| 1-66 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 1-67 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 1-68 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 1-69 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 1-70 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 1-71 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 1-72 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 1-73 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 1-74 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 1-75 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 1-76 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |
| 1-77 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 1-78 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 1-79 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 1-80 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 1-81 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 1-82 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 1-83 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 1-84 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 1-85 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 1-86 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 1-87 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 1-88 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 1-89 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 1-90 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 1-91 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 1-92 | $CH_2CH_2$ | $MeSCH_2CH_2SO$ | $CF_3S$ | | |
| 1-93 | $CH_2CH_2$ | $MeSCH_2CH_2SO_2$ | $CF_3S$ | | |
| 1-94 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 1-95 | $CH_2CH_2$ | $MeSCH_2CH_2SO$ | $CF_3SO$ | | |
| 1-96 | $CH_2CH_2$ | $MeSCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 1-97 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |
| 1-98 | $CH_2CH_2$ | $MeSCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 1-99 | $CH_2CH_2$ | $MeSCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 1-100 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 1-101 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2SO$ | $CF_3S$ | | |
| 1-102 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2SO_2$ | $CF_3S$ | | |
| 1-103 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 1-104 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2SO$ | $CF_3SO$ | | |
| 1-105 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 1-106 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |
| 1-107 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 1-108 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2SO_2$ | $CF_3SO_2$ | | |

Table 2 $R^1 = CSNH_2$, W = C-Cl, $R^2$ = Cl, $R^3 = CF_3$, $R^4$ = Et

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 2-1 | $CH_2CH_2$ | MeS | $CF_3S$ | | |
| 2-2 | $CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 2-3 | $CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 2-4 | $CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 2-5 | $CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 2-6 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 2-7 | $CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 2-8 | $CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 2-9 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 2-10 | $CH_2CH_2CH_2$ | MeS | $CF_3S$ | | |
| 2-11 | $CH_2CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 2-12 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 2-13 | $CH_2CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 2-14 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 2-15 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 2-16 | $CH_2CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 2-17 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 2-18 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 2-19 | $CH_2CH_2$ | EtS | $CF_3S$ | | |
| 2-20 | $CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 2-21 | $CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 2-22 | $CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 2-23 | $CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 2-24 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 2-25 | $CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 2-26 | $CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 2-27 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 2-28 | $CH_2CH_2CH_2$ | EtS | $CF_3S$ | | |
| 2-29 | $CH_2CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 2-30 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 2-31 | $CH_2CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 2-32 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 2-33 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 2-34 | $CH_2CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 2-35 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 2-36 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |
| 2-37 | $CH_2CH_2$ | PrS | $CF_3S$ | | |
| 2-38 | $CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 2-39 | $CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 2-40 | $CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 2-41 | $CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 2-42 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 2-43 | $CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 2-44 | $CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 2-45 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 2-46 | $CH_2CH_2CH_2$ | PrS | $CF_3S$ | | |
| 2-47 | $CH_2CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 2-48 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 2-49 | $CH_2CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 2-50 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 2-51 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 2-52 | $CH_2CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 2-53 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 2-54 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 2-55 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 2-56 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 2-57 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 2-58 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 2-59 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 2-60 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 2-61 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 2-62 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 2-63 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 2-64 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 2-65 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |
| 2-66 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 2-67 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 2-68 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 2-69 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 2-70 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 2-71 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 2-72 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 2-73 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 2-74 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 2-75 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 2-76 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |
| 2-77 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 2-78 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 2-79 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 2-80 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 2-81 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 2-82 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 2-83 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 2-84 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 2-85 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 2-86 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 2-87 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 2-88 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 2-89 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 2-90 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 2-91 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 2-92 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 2-93 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |
| 2-94 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 2-95 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 2-96 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |

Table 3 $R^1 = CSNH_2$, W = C-Cl, $R^2$ = Cl, $R^3 = CF_3$, $R^4 = CO_2Me$

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 3-1 | $CH_2CH_2$ | MeS | $CF_3S$ | | |
| 3-2 | $CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 3-3 | $CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 3-4 | $CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 3-5 | $CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 3-6 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 3-7 | $CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 3-8 | $CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 3-9 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 3-10 | $CH_2CH_2CH_2$ | MeS | $CF_3S$ | | |
| 3-11 | $CH_2CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 3-12 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 3-13 | $CH_2CH_2CH_2$ | MeS | $CF_3SO$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 3-14 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 3-15 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 3-16 | $CH_2CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 3-17 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 3-18 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 3-19 | $CH_2CH_2$ | EtS | $CF_3S$ | | |
| 3-20 | $CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 3-21 | $CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 3-22 | $CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 3-23 | $CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 3-24 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 3-25 | $CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 3-26 | $CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 3-27 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |
| 3-28 | $CH_2CH_2CH_2$ | EtS | $CF_3S$ | | |
| 3-29 | $CH_2CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 3-30 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 3-31 | $CH_2CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 3-32 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 3-33 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 3-34 | $CH_2CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 3-35 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 3-36 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |
| 3-37 | $CH_2CH_2$ | PrS | $CF_3S$ | | |
| 3-38 | $CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 3-39 | $CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 3-40 | $CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 3-41 | $CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 3-42 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 3-43 | $CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 3-44 | $CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 3-45 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 3-46 | $CH_2CH_2CH_2$ | PrS | $CF_3S$ | | |
| 3-47 | $CH_2CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 3-48 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 3-49 | $CH_2CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 3-50 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 3-51 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 3-52 | $CH_2CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 3-53 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 3-54 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 3-55 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 3-56 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |
| 3-57 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 3-58 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 3-59 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 3-60 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 3-61 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 3-62 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 3-63 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 3-64 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 3-65 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |
| 3-66 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 3-67 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 3-68 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 3-69 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 3-70 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 3-71 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 3-72 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 3-73 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 3-74 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 3-75 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 3-76 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |
| 3-77 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 3-78 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 3-79 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 3-80 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 3-81 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 3-82 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 3-83 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 3-84 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 3-85 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |
| 3-86 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 3-87 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 3-88 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 3-89 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 3-90 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 3-91 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 3-92 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 3-93 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |
| 3-94 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 3-95 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 3-96 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |

Table 4 $R^1 = CSNH_2$, W = C-Cl, $R^2$ = Cl, $R^3 = CF_3$, $R^4 = CO_2CH_2CH_2OMe$

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 4-1 | $CH_2CH_2$ | MeS | $CF_3S$ | | |
| 4-2 | $CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 4-3 | $CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 4-4 | $CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 4-5 | $CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 4-6 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 4-7 | $CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 4-8 | $CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 4-9 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 4-10 | $CH_2CH_2CH_2$ | MeS | $CF_3S$ | | |
| 4-11 | $CH_2CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 4-12 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 4-13 | $CH_2CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 4-14 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 4-15 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 4-16 | $CH_2CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 4-17 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 4-18 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 4-19 | $CH_2CH_2$ | EtS | $CF_3S$ | | |
| 4-20 | $CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 4-21 | $CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 4-22 | $CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 4-23 | $CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 4-24 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 4-25 | $CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 4-26 | $CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 4-27 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 4-28 | $CH_2CH_2CH_2$ | EtS | $CF_3S$ | | |
| 4-29 | $CH_2CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 4-30 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 4-31 | $CH_2CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 4-32 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 4-33 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 4-34 | $CH_2CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 4-35 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 4-36 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |
| 4-37 | $CH_2CH_2$ | PrS | $CF_3S$ | | |
| 4-38 | $CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 4-39 | $CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 4-40 | $CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 4-41 | $CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 4-42 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 4-43 | $CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 4-44 | $CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 4-45 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 4-46 | $CH_2CH_2CH_2$ | PrS | $CF_3S$ | | |
| 4-47 | $CH_2CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 4-48 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 4-49 | $CH_2CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 4-50 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 4-51 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 4-52 | $CH_2CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 4-53 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 4-54 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 4-55 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 4-56 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 4-57 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 4-58 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 4-59 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 4-60 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 4-61 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 4-62 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 4-63 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 4-64 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 4-65 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |
| 4-66 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 4-67 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 4-68 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 4-69 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 4-70 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 4-71 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 4-72 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 4-73 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 4-74 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 4-75 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 4-76 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |
| 4-77 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 4-78 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 4-79 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 4-80 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 4-81 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 4-82 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 4-83 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 4-84 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 4-85 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 4-86 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 4-87 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 4-88 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 4-89 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 4-90 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 4-91 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 4-92 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 4-93 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |
| 4-94 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 4-95 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 4-96 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |

Table 5 $R^1 = CSNH_2$, W = C-Cl, $R^2$ = Cl, $R^3 = CF_3$, $R^4 = CO_2CH_2CH_2SMe$

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 5-1 | $CH_2CH_2$ | MeS | $CF_3S$ | | |
| 5-2 | $CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 5-3 | $CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 5-4 | $CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 5-5 | $CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 5-6 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 5-7 | $CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 5-8 | $CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 5-9 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 5-10 | $CH_2CH_2CH_2$ | MeS | $CF_3S$ | | |
| 5-11 | $CH_2CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 5-12 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 5-13 | $CH_2CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 5-14 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 5-15 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 5-16 | $CH_2CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 5-17 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 5-18 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 5-19 | $CH_2CH_2$ | EtS | $CF_3S$ | | |
| 5-20 | $CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 5-21 | $CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 5-22 | $CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 5-23 | $CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 5-24 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 5-25 | $CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 5-26 | $CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 5-27 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |
| 5-28 | $CH_2CH_2CH_2$ | EtS | $CF_3S$ | | |
| 5-29 | $CH_2CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 5-30 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 5-31 | $CH_2CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 5-32 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 5-33 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 5-34 | $CH_2CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 5-35 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 5-36 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |
| 5-37 | $CH_2CH_2$ | PrS | $CF_3S$ | | |
| 5-38 | $CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 5-39 | $CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 5-40 | $CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 5-41 | $CH_2CH_2$ | PrSO | $CF_3SO$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 5-42 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 5-43 | $CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 5-44 | $CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 5-45 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 5-46 | $CH_2CH_2CH_2$ | PrS | $CF_3S$ | | |
| 5-47 | $CH_2CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 5-48 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 5-49 | $CH_2CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 5-50 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 5-51 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 5-52 | $CH_2CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 5-53 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 5-54 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 5-55 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 5-56 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |
| 5-57 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 5-58 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 5-59 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 5-60 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 5-61 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 5-62 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 5-63 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 5-64 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 5-65 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |
| 5-66 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 5-67 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 5-68 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 5-69 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 5-70 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 5-71 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 5-72 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 5-73 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 5-74 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 5-75 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 5-76 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |
| 5-77 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 5-78 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 5-79 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 5-80 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 5-81 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 5-82 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 5-83 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 5-84 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 5-85 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |
| 5-86 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 5-87 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 5-88 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 5-89 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 5-90 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 5-91 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 5-92 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 5-93 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |
| 5-94 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 5-95 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 5-96 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |

Table 6 $R^1 = CSNH_2$, W = C-Cl, $R^2$ = Cl, $R^3 = CF_3$, $R^4 = CO_2CH_2CH_2Cl$

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 6-1 | $CH_2CH_2$ | MeS | $CF_3S$ | | |
| 6-2 | $CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 6-3 | $CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 6-4 | $CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 6-5 | $CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 6-6 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 6-7 | $CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 6-8 | $CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 6-9 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 6-10 | $CH_2CH_2CH_2$ | MeS | $CF_3S$ | | |
| 6-11 | $CH_2CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 6-12 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 6-13 | $CH_2CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 6-14 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 6-15 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 6-16 | $CH_2CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 6-17 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 6-18 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 6-19 | $CH_2CH_2$ | EtS | $CF_3S$ | | |
| 6-20 | $CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 6-21 | $CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 6-22 | $CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 6-23 | $CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 6-24 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 6-25 | $CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 6-26 | $CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 6-27 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 6-28 | $CH_2CH_2CH_2$ | EtS | $CF_3S$ | | |
| 6-29 | $CH_2CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 6-30 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 6-31 | $CH_2CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 6-32 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 6-33 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 6-34 | $CH_2CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 6-35 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 6-36 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |
| 6-37 | $CH_2CH_2$ | PrS | $CF_3S$ | | |
| 6-38 | $CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 6-39 | $CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 6-40 | $CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 6-41 | $CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 6-42 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 6-43 | $CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 6-44 | $CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 6-45 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 6-46 | $CH_2CH_2CH_2$ | PrS | $CF_3S$ | | |
| 6-47 | $CH_2CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 6-48 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 6-49 | $CH_2CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 6-50 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 6-51 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 6-52 | $CH_2CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 6-53 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 6-54 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 6-55 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 6-56 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 6-57 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 6-58 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 6-59 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 6-60 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 6-61 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 6-62 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 6-63 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 6-64 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 6-65 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |
| 6-66 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 6-67 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 6-68 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 6-69 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 6-70 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 6-71 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 6-72 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 6-73 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 6-74 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 6-75 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 6-76 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |
| 6-77 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 6-78 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 6-79 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 6-80 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 6-81 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 6-82 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 6-83 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 6-84 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 6-85 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 6-86 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 6-87 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 6-88 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 6-89 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 6-90 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 6-91 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 6-92 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 6-93 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |
| 6-94 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 6-95 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 6-96 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |

Table 7 $R^1$ = C(=NH)-S-Me, W = C-Cl, $R^2$ = Cl, $R^3$ = $CF_3$, $R^6$ = X = F, $R^4$ = Me

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 7-1 | $CH_2CH_2$ | MeS | $CF_3S$ | | |
| 7-2 | $CH_2CH_2$ | MeSO | $CF_3S$ | | -44.78, -64.08 |
| 7-3 | $CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | -44.37, -63.67 |
| 7-4 | $CH_2CH_2$ | MeS | $CF_3SO$ | | -63.72, -76.6 |
| 7-5 | $CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 7-6 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 7-7 | $CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 7-8 | $CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 7-9 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | -63.73, -74.56, -78.6 |
| 7-10 | $CH_2CH_2CH_2$ | MeS | $CF_3S$ | | |
| 7-11 | $CH_2CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 7-12 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 7-13 | $CH_2CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 7-14 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 7-15 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 7-16 | $CH_2CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 7-17 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 7-18 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 7-19 | $CH_2CH_2$ | EtS | $CF_3S$ | | |
| 7-20 | $CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 7-21 | $CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 7-22 | $CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 7-23 | $CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 7-24 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 7-25 | $CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 7-26 | $CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 7-27 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |
| 7-28 | $CH_2CH_2CH_2$ | EtS | $CF_3S$ | | |
| 7-29 | $CH_2CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 7-30 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 7-31 | $CH_2CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 7-32 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 7-33 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 7-34 | $CH_2CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 7-35 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 7-36 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |
| 7-37 | $CH_2CH_2$ | PrS | $CF_3S$ | | |
| 7-38 | $CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 7-39 | $CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 7-40 | $CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 7-41 | $CH_2CH_2$ | PrSO | $CF_3SO$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 7-42 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 7-43 | $CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 7-44 | $CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 7-45 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 7-46 | $CH_2CH_2CH_2$ | PrS | $CF_3S$ | | |
| 7-47 | $CH_2CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 7-48 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 7-49 | $CH_2CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 7-50 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 7-51 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 7-52 | $CH_2CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 7-53 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 7-54 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 7-55 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 7-56 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |
| 7-57 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 7-58 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 7-59 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 7-60 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 7-61 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 7-62 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 7-63 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 7-64 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 7-65 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |
| 7-66 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 7-67 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 7-68 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 7-69 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 7-70 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 7-71 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 7-72 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 7-73 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 7-74 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 7-75 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 7-76 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |
| 7-77 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 7-78 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 7-79 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 7-80 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 7-81 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 7-82 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 7-83 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 7-84 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 7-85 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |
| 7-86 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 7-87 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 7-88 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 7-89 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 7-90 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 7-91 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 7-92 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 7-93 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |
| 7-94 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 7-95 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 7-96 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |

Table 8 $R^1$ = C(=NH)-S-Et, W = C-Cl, $R^2$ = Cl, $R^3$ = $CF_3$, $R^6$ = X = F, $R^4$ = Me

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 8-1 | $CH_2CH_2$ | MeS | $CF_3S$ | | -45.05, -64.09 |
| 8-2 | $CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 8-3 | $CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 8-4 | $CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 8-5 | $CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 8-6 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 8-7 | $CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 8-8 | $CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 8-9 | $CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 8-10 | $CH_2CH_2CH_2$ | MeS | $CF_3S$ | | |
| 8-11 | $CH_2CH_2CH_2$ | MeSO | $CF_3S$ | | |
| 8-12 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 8-13 | $CH_2CH_2CH_2$ | MeS | $CF_3SO$ | | |
| 8-14 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO$ | | |
| 8-15 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 8-16 | $CH_2CH_2CH_2$ | MeS | $CF_3SO_2$ | | |
| 8-17 | $CH_2CH_2CH_2$ | MeSO | $CF_3SO_2$ | | |
| 8-18 | $CH_2CH_2CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 8-19 | $CH_2CH_2$ | EtS | $CF_3S$ | | |
| 8-20 | $CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 8-21 | $CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 8-22 | $CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 8-23 | $CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 8-24 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 8-25 | $CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 8-26 | $CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 8-27 | $CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 8-28 | $CH_2CH_2CH_2$ | EtS | $CF_3S$ | | |
| 8-29 | $CH_2CH_2CH_2$ | EtSO | $CF_3S$ | | |
| 8-30 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3S$ | | |
| 8-31 | $CH_2CH_2CH_2$ | EtS | $CF_3SO$ | | |
| 8-32 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO$ | | |
| 8-33 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO$ | | |
| 8-34 | $CH_2CH_2CH_2$ | EtS | $CF_3SO_2$ | | |
| 8-35 | $CH_2CH_2CH_2$ | EtSO | $CF_3SO_2$ | | |
| 8-36 | $CH_2CH_2CH_2$ | $EtSO_2$ | $CF_3SO_2$ | | |
| 8-37 | $CH_2CH_2$ | PrS | $CF_3S$ | | |
| 8-38 | $CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 8-39 | $CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 8-40 | $CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 8-41 | $CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 8-42 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 8-43 | $CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 8-44 | $CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 8-45 | $CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 8-46 | $CH_2CH_2CH_2$ | PrS | $CF_3S$ | | |
| 8-47 | $CH_2CH_2CH_2$ | PrSO | $CF_3S$ | | |
| 8-48 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3S$ | | |
| 8-49 | $CH_2CH_2CH_2$ | PrS | $CF_3SO$ | | |
| 8-50 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO$ | | |
| 8-51 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO$ | | |
| 8-52 | $CH_2CH_2CH_2$ | PrS | $CF_3SO_2$ | | |
| 8-53 | $CH_2CH_2CH_2$ | PrSO | $CF_3SO_2$ | | |
| 8-54 | $CH_2CH_2CH_2$ | $PrSO_2$ | $CF_3SO_2$ | | |
| 8-55 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 8-56 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 8-57 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 8-58 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 8-59 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 8-60 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 8-61 | $CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 8-62 | $CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 8-63 | $CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 8-64 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3S$ | | |
| 8-65 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3S$ | | |
| 8-66 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3S$ | | |
| 8-67 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO$ | | |
| 8-68 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO$ | | |
| 8-69 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 8-70 | $CH_2CH_2CH_2$ | $ClCH_2CH_2S$ | $CF_3SO_2$ | | |
| 8-71 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 8-72 | $CH_2CH_2CH_2$ | $ClCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 8-73 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 8-74 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 8-75 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 8-76 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |
| 8-77 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 8-78 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 8-79 | $CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 8-80 | $CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 8-81 | $CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 8-82 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3S$ | | |
| 8-83 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3S$ | | |
| 8-84 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3S$ | | |
| 8-85 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO$ | | |

| Cpd No. | A | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 8-86 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO$ | | |
| 8-87 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO$ | | |
| 8-88 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2S$ | $CF_3SO_2$ | | |
| 8-89 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO$ | $CF_3SO_2$ | | |
| 8-90 | $CH_2CH_2CH_2$ | $MeOCH_2CH_2SO_2$ | $CF_3SO_2$ | | |
| 8-91 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 8-92 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 8-93 | $CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |
| 8-94 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3S$ | | |
| 8-95 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO$ | | |
| 8-96 | $CH_2CH_2CH_2$ | $MeSCH_2CH_2S$ | $CF_3SO_2$ | | |

Table 9 $R^1 = CSNH_2$, W = C-Cl, $R^2$ = Cl, $R^3 = CF_3$, A is $CH_2CH_2$.

| Cpd No. | $R^4$ | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 9-1 | $CO_2Me$ | MeS | $CF_3S$ | | |
| 9-2 | $CO_2Me$ | MeSO | $CF_3S$ | | |
| 9-3 | $CO_2Me$ | $MeSO_2$ | $CF_3S$ | | |
| 9-4 | $CO_2Me$ | MeS | $CF_3SO$ | | |
| 9-5 | $CO_2Me$ | MeSO | $CF_3SO$ | | |
| 9-6 | $CO_2Me$ | $MeSO_2$ | $CF_3SO$ | | |
| 9-7 | $CO_2Me$ | MeS | $CF_3SO_2$ | | |
| 9-8 | $CO_2Me$ | MeSO | $CF_3SO_2$ | | |
| 9-9 | $CO_2Me$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-10 | $CO_2Et$ | MeS | $CF_3S$ | | |
| 9-11 | $CO_2Et$ | MeSO | $CF_3S$ | | |
| 9-12 | $CO_2Et$ | $MeSO_2$ | $CF_3S$ | | |
| 9-13 | $CO_2Et$ | MeS | $CF_3SO$ | | |

| Cpd No. | $R^4$ | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 9-14 | $CO_2Et$ | MeSO | $CF_3SO$ | | |
| 9-15 | $CO_2Et$ | $MeSO_2$ | $CF_3SO$ | | |
| 9-16 | $CO_2Et$ | MeS | $CF_3SO_2$ | | |
| 9-17 | $CO_2Et$ | MeSO | $CF_3SO_2$ | | |
| 9-18 | $CO_2Et$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-19 | $CO_2CH_2CH=CH_2$ | MeS | $CF_3S$ | | |
| 9-20 | $CO_2CH_2CH=CH_2$ | MeSO | $CF_3S$ | | |
| 9-21 | $CO_2CH_2CH=CH_2$ | $MeSO_2$ | $CF_3S$ | | |
| 9-22 | $CO_2CH_2CH=CH_2$ | MeS | $CF_3SO$ | | |
| 9-23 | $CO_2CH_2CH=CH_2$ | MeSO | $CF_3SO$ | | |
| 9-24 | $CO_2CH_2CH=CH_2$ | $MeSO_2$ | $CF_3SO$ | | |
| 9-25 | $CO_2CH_2CH=CH_2$ | MeS | $CF_3SO_2$ | | |
| 9-26 | $CO_2CH_2CH=CH_2$ | MeSO | $CF_3SO_2$ | | |
| 9-27 | $CO_2CH_2CH=CH_2$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-28 | $CO_2CH_2CCH$ | MeS | $CF_3S$ | | |
| 9-29 | $CO_2CH_2CCH$ | MeSO | $CF_3S$ | | |
| 9-30 | $CO_2CH_2CCH$ | $MeSO_2$ | $CF_3S$ | | |
| 9-31 | $CO_2CH_2CCH$ | MeS | $CF_3SO$ | | |
| 9-32 | $CO_2CH_2CCH$ | MeSO | $CF_3SO$ | | |
| 9-33 | $CO_2CH_2CCH$ | $MeSO_2$ | $CF_3SO$ | | |
| 9-34 | $CO_2CH_2CCH$ | MeS | $CF_3SO_2$ | | |
| 9-35 | $CO_2CH_2CCH$ | MeSO | $CF_3SO_2$ | | |
| 9-36 | $CO_2CH_2CCH$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-37 | $CO_2Ph$ | MeS | $CF_3S$ | | |
| 9-38 | $CO_2Ph$ | MeSO | $CF_3S$ | | |
| 9-39 | $CO_2Ph$ | $MeSO_2$ | $CF_3S$ | | |
| 9-40 | $CO_2Ph$ | MeS | $CF_3SO$ | | |
| 9-41 | $CO_2Ph$ | MeSO | $CF_3SO$ | | |
| 9-42 | $CO_2Ph$ | $MeSO_2$ | $CF_3SO$ | | |

| Cpd No. | $R^4$ | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 9-43 | $CO_2Ph$ | MeS | $CF_3SO_2$ | | |
| 9-44 | $CO_2Ph$ | MeSO | $CF_3SO_2$ | | |
| 9-45 | $CO_2Ph$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-46 | $CO_2$(2F Ph) | MeS | $CF_3S$ | | |
| 9-47 | $CO_2$(2F Ph) | MeSO | $CF_3S$ | | |
| 9-48 | $CO_2$(2F Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-49 | $CO_2$(2F Ph) | MeS | $CF_3SO$ | | |
| 9-50 | $CO_2$(2F Ph) | MeSO | $CF_3SO$ | | |
| 9-51 | $CO_2$(2F Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-52 | $CO_2$(2F Ph) | MeS | $CF_3SO_2$ | | |
| 9-53 | $CO_2$(2F Ph) | MeSO | $CF_3SO_2$ | | |
| 9-54 | $CO_2$(2F Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-55 | $CO_2$(2Cl Ph) | MeS | $CF_3S$ | | |
| 9-56 | $CO_2$(2Cl Ph) | MeSO | $CF_3S$ | | |
| 9-57 | $CO_2$(2Cl Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-58 | $CO_2$(2Cl Ph) | MeS | $CF_3SO$ | | |
| 9-59 | $CO_2$(2Cl Ph) | MeSO | $CF_3SO$ | | |
| 9-60 | $CO_2$(2Cl Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-61 | $CO_2$(2Cl Ph) | MeS | $CF_3SO_2$ | | |
| 9-62 | $CO_2$(2Cl Ph) | MeSO | $CF_3SO_2$ | | |
| 9-63 | $CO_2$(2Cl Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-64 | $CO_2$(4Cl Ph) | MeS | $CF_3S$ | | |
| 9-65 | $CO_2$(4Cl Ph) | MeSO | $CF_3S$ | | |
| 9-66 | $CO_2$(4Cl Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-67 | $CO_2$(4Cl Ph) | MeS | $CF_3SO$ | | |
| 9-68 | $CO_2$(4Cl Ph) | MeSO | $CF_3SO$ | | |
| 9-69 | $CO_2$(4Cl Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-70 | $CO_2$(4Cl Ph) | MeS | $CF_3SO_2$ | | |
| 9-71 | $CO_2$(4Cl Ph) | MeSO | $CF_3SO_2$ | | |

| Cpd No. | $R^4$ | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 9-72 | $CO_2$(4Cl Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-73 | $CO_2$(4Br Ph) | MeS | $CF_3S$ | | |
| 9-74 | $CO_2$(4Br Ph) | MeSO | $CF_3S$ | | |
| 9-75 | $CO_2$(4Br Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-76 | $CO_2$(4Br Ph) | MeS | $CF_3SO$ | | |
| 9-77 | $CO_2$(4Br Ph) | MeSO | $CF_3SO$ | | |
| 9-78 | $CO_2$(4Br Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-79 | $CO_2$(4Br Ph) | MeS | $CF_3SO_2$ | | |
| 9-80 | $CO_2$(4Br Ph) | MeSO | $CF_3SO_2$ | | |
| 9-81 | $CO_2$(4Br Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-82 | $CO_2$(4F Ph) | MeS | $CF_3S$ | | |
| 9-83 | $CO_2$(4F Ph) | MeSO | $CF_3S$ | | |
| 9-84 | $CO_2$(4F Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-85 | $CO_2$(4F Ph) | MeS | $CF_3SO$ | | |
| 9-86 | $CO_2$(4F Ph) | MeSO | $CF_3SO$ | | |
| 9-87 | $CO_2$(4F Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-88 | $CO_2$(4F Ph) | MeS | $CF_3SO_2$ | | |
| 9-89 | $CO_2$(4F Ph) | MeSO | $CF_3SO_2$ | | |
| 9-90 | $CO_2$(4F Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-91 | $CO_2$(4$NO_2$ Ph) | MeS | $CF_3S$ | | |
| 9-92 | $CO_2$(4$NO_2$ Ph) | MeSO | $CF_3S$ | | |
| 9-93 | $CO_2$(4$NO_2$ Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-94 | $CO_2$(4$NO_2$ Ph) | MeS | $CF_3SO$ | | |
| 9-95 | $CO_2$(4$NO_2$ Ph) | MeSO | $CF_3SO$ | | |
| 9-96 | $CO_2$(4$NO_2$ Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-97 | $CO_2$(4$NO_2$ Ph) | MeS | $CF_3SO_2$ | | |
| 9-98 | $CO_2$(4$NO_2$ Ph) | MeSO | $CF_3SO_2$ | | |
| 9-99 | $CO_2$(4$NO_2$ Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-100 | $CO_2$(4Me Ph) | MeS | $CF_3S$ | | |

| Cpd No. | $R^4$ | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 9-101 | $CO_2$(4Me Ph) | MeSO | $CF_3S$ | | |
| 9-102 | $CO_2$(4Me Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-103 | $CO_2$(4Me Ph) | MeS | $CF_3SO$ | | |
| 9-104 | $CO_2$(4Me Ph) | MeSO | $CF_3SO$ | | |
| 9-105 | $CO_2$(4Me Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-106 | $CO_2$(4Me Ph) | MeS | $CF_3SO_2$ | | |
| 9-107 | $CO_2$(4Me Ph) | MeSO | $CF_3SO_2$ | | |
| 9-108 | $CO_2$(4Me Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-109 | $CO_2$(4OMe Ph) | MeS | $CF_3S$ | | |
| 9-110 | $CO_2$(4OMe Ph) | MeSO | $CF_3S$ | | |
| 9-111 | $CO_2$(4OMe Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-112 | $CO_2$(4OMe Ph) | MeS | $CF_3SO$ | | |
| 9-113 | $CO_2$(4OMe Ph) | MeSO | $CF_3SO$ | | |
| 9-114 | $CO_2$(4OMe Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-115 | $CO_2$(4OMe Ph) | MeS | $CF_3SO_2$ | | |
| 9-116 | $CO_2$(4OMe Ph) | MeSO | $CF_3SO_2$ | | |
| 9-117 | $CO_2$(4OMe Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-118 | $CO_2CH_2Ph$ | MeS | $CF_3S$ | | |
| 9-119 | $CO_2CH_2Ph$ | MeSO | $CF_3S$ | | |
| 9-120 | $CO_2CH_2Ph$ | $MeSO_2$ | $CF_3S$ | | |
| 9-121 | $CO_2CH_2Ph$ | MeS | $CF_3SO$ | | |
| 9-122 | $CO_2CH_2Ph$ | MeSO | $CF_3SO$ | | |
| 9-123 | $CO_2CH_2Ph$ | $MeSO_2$ | $CF_3SO$ | | |
| 9-124 | $CO_2CH_2Ph$ | MeS | $CF_3SO_2$ | | |
| 9-125 | $CO_2CH_2Ph$ | MeSO | $CF_3SO_2$ | | |
| 9-126 | $CO_2CH_2Ph$ | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-127 | $CO_2CH_2$(2F Ph) | MeS | $CF_3S$ | | |
| 9-128 | $CO_2CH_2$(2F Ph) | MeSO | $CF_3S$ | | |
| 9-129 | $CO_2CH_2$(2F Ph) | $MeSO_2$ | $CF_3S$ | | |

| Cpd No. | $R^4$ | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 9-130 | $CO_2CH_2$(2F Ph) | MeS | $CF_3SO$ | | |
| 9-131 | $CO_2CH_2$(2F Ph) | MeSO | $CF_3SO$ | | |
| 9-132 | $CO_2CH_2$(2F Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-133 | $CO_2CH_2$(2F Ph) | MeS | $CF_3SO_2$ | | |
| 9-134 | $CO_2CH_2$(2F Ph) | MeSO | $CF_3SO_2$ | | |
| 9-135 | $CO_2CH_2$(2F Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-136 | $CO_2CH_2$(2Cl Ph) | MeS | $CF_3S$ | | |
| 9-137 | $CO_2CH_2$(2Cl Ph) | MeSO | $CF_3S$ | | |
| 9-138 | $CO_2CH_2$(2Cl Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-139 | $CO_2CH_2$(2Cl Ph) | MeS | $CF_3SO$ | | |
| 9-140 | $CO_2CH_2$(2Cl Ph) | MeSO | $CF_3SO$ | | |
| 9-141 | $CO_2CH_2$(2Cl Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-142 | $CO_2CH_2$(2Cl Ph) | MeS | $CF_3SO_2$ | | |
| 9-143 | $CO_2CH_2$(2Cl Ph) | MeSO | $CF_3SO_2$ | | |
| 9-144 | $CO_2CH_2$(2Cl Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-145 | $CO_2CH_2$(4Cl Ph) | MeS | $CF_3S$ | | |
| 9-146 | $CO_2CH_2$(4Cl Ph) | MeSO | $CF_3S$ | | |
| 9-147 | $CO_2CH_2$(4Cl Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-148 | $CO_2CH_2$(4Cl Ph) | MeS | $CF_3SO$ | | |
| 9-149 | $CO_2CH_2$(4Cl Ph) | MeSO | $CF_3SO$ | | |
| 9-150 | $CO_2CH_2$(4Cl Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-151 | $CO_2CH_2$(4Cl Ph) | MeS | $CF_3SO_2$ | | |
| 9-152 | $CO_2CH_2$(4Cl Ph) | MeSO | $CF_3SO_2$ | | |
| 9-153 | $CO_2CH_2$(4Cl Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-154 | $CO_2CH_2$(4Br Ph) | MeS | $CF_3S$ | | |
| 9-155 | $CO_2CH_2$(4Br Ph) | MeSO | $CF_3S$ | | |
| 9-156 | $CO_2CH_2$(4Br Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-157 | $CO_2CH_2$(4Br Ph) | MeS | $CF_3SO$ | | |
| 9-158 | $CO_2CH_2$(4Br Ph) | MeSO | $CF_3SO$ | | |

| Cpd No. | $R^4$ | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 9-159 | $CO_2CH_2$(4Br Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-160 | $CO_2CH_2$(4Br Ph) | MeS | $CF_3SO_2$ | | |
| 9-161 | $CO_2CH_2$(4Br Ph) | MeSO | $CF_3SO_2$ | | |
| 9-162 | $CO_2CH_2$(4Br Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-163 | $CO_2CH_2$(4F Ph) | MeS | $CF_3S$ | | |
| 9-164 | $CO_2CH_2$(4F Ph) | MeSO | $CF_3S$ | | |
| 9-165 | $CO_2CH_2$(4F Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-166 | $CO_2CH_2$(4F Ph) | MeS | $CF_3SO$ | | |
| 9-167 | $CO_2CH_2$(4F Ph) | MeSO | $CF_3SO$ | | |
| 9-168 | $CO_2CH_2$(4F Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-169 | $CO_2CH_2$(4F Ph) | MeS | $CF_3SO_2$ | | |
| 9-170 | $CO_2CH_2$(4F Ph) | MeSO | $CF_3SO_2$ | | |
| 9-171 | $CO_2CH_2$(4F Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-172 | $CO_2CH_2$(4$NO_2$ Ph) | MeS | $CF_3S$ | | |
| 9-173 | $CO_2CH_2$(4$NO_2$ Ph) | MeSO | $CF_3S$ | | |
| 9-174 | $CO_2CH_2$(4$NO_2$ Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-175 | $CO_2CH_2$(4$NO_2$ Ph) | MeS | $CF_3SO$ | | |
| 9-176 | $CO_2CH_2$(4$NO_2$ Ph) | MeSO | $CF_3SO$ | | |
| 9-177 | $CO_2CH_2$(4$NO_2$ Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-178 | $CO_2CH_2$(4$NO_2$ Ph) | MeS | $CF_3SO_2$ | | |
| 9-179 | $CO_2CH_2$(4$NO_2$ Ph) | MeSO | $CF_3SO_2$ | | |
| 9-180 | $CO_2CH_2$(4$NO_2$ Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-181 | $CO_2CH_2$(4Me Ph) | MeS | $CF_3S$ | | |
| 9-182 | $CO_2CH_2$(4Me Ph) | MeSO | $CF_3S$ | | |
| 9-183 | $CO_2CH_2$(4Me Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-184 | $CO_2CH_2$(4Me Ph) | MeS | $CF_3SO$ | | |
| 9-185 | $CO_2CH_2$(4Me Ph) | MeSO | $CF_3SO$ | | |
| 9-186 | $CO_2CH_2$(4Me Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-187 | $CO_2CH_2$(4Me Ph) | MeS | $CF_3SO_2$ | | |

| Cpd No. | $R^4$ | $R^5S(O)_m$ | $R^6CFX\text{-}S(O)_n$ | mp °C | 19F-NMR |
|---|---|---|---|---|---|
| 9-188 | $CO_2CH_2$(4Me Ph) | MeSO | $CF_3SO_2$ | | |
| 9-189 | $CO_2CH_2$(4Me Ph) | $MeSO_2$ | $CF_3SO_2$ | | |
| 9-190 | $CO_2CH_2$(4OMe Ph) | MeS | $CF_3S$ | | |
| 9-191 | $CO_2CH_2$(4OMe Ph) | MeSO | $CF_3S$ | | |
| 9-192 | $CO_2CH_2$(4OMe Ph) | $MeSO_2$ | $CF_3S$ | | |
| 9-193 | $CO_2CH_2$(4OMe Ph) | MeS | $CF_3SO$ | | |
| 9-194 | $CO_2CH_2$(4OMe Ph) | MeSO | $CF_3SO$ | | |
| 9-195 | $CO_2CH_2$(4OMe Ph) | $MeSO_2$ | $CF_3SO$ | | |
| 9-196 | $CO_2CH_2$(4OMe Ph) | MeS | $CF_3SO_2$ | | |
| 9-197 | $CO_2CH_2$(4OMe Ph) | MeSO | $CF_3SO_2$ | | |
| 9-198 | $CO_2CH_2$(4OMe Ph) | $MeSO_2$ | $CF_3SO_2$ | | |

According to a further feature of the present invention there is provided a method for the control of pests at a locus which comprises applying thereto an effective amount of a compound of formula (I) or a salt thereof. For this purpose, the said compound is normally used in the form of a pesticidal composition (i.e. in association with compatible diluents or carriers and/or surface active agents suitable for use in pesticidal compositions), for example as hereinafter described.

The term "compound of the invention" as used hereinafter embraces a 5-substituted-alkylaminopyrazole of formula (I) as defined above and a pesticidally acceptable salt thereof.

One aspect of the present invention as defined above is a method for the control of pests at a locus. The locus includes, for example, the pest itself, the place (plant, field, forest, orchard, waterway, soil, plant product, or the like) where the pest resides or feeds, or a place susceptible to future infestation by the pest. The compound of the invention may therefore be applied directly to the pest, to the place where the pest resides or feeds, or to the place susceptible to future infestation by the pest.

As is evident from the foregoing pesticidal uses, the present invention provides pesticidally active compounds and methods of use of said compounds for the control of a number of pest species which includes: arthropods, especially insects or mites, or plant nematodes. The compound of the invention may thus be advantageously employed in practical uses, for example, in agricultural or horticultural crops, in forestry, in veterinary medicine or livestock husbandry, or in public health.

The compounds of the invention may be used for example in the following applications and on the following pests:

For the control of soil insects, such as corn rootworm, termites (especially for protection of structures), root maggots, wireworms, root weevils, stalkborers, cutworms, root aphids, or grubs. They may also be used to provide activity against plant pathogenic nematodes, such as root-knot, cyst, dagger, lesion, or stem or bulb nematodes, or against mites. For the control of soil pests, for example corn rootworm, the compounds are advantageously applied to or incorporated at an effective rate into the soil in which crops are planted or to be planted or to the seeds or growing plant roots.

In the area of public health, the compounds are especially useful in the control of many insects, especially filth flies or other Dipteran pests, such as houseflies, stableflies, soldierflies, hornflies, deerflies, horseflies, midges, punkies, blackflies, or mosquitoes.

In the protection of stored products, for example cereals, including grain or flour, groundnuts, animal feedstuffs, timber or household goods, e.g. carpets and textiles, compounds of the invention are useful against attack by arthropods, more especially beetles, including weevils, moths or mites, for example Ephestia spp. (flour moths), Anthrenus spp. (carpet beetles), Tribolium spp. (flour beetles), Sitophilus spp. (grain weevils) or Acarus spp. (mites).

In the control of cockroaches, ants or termites or similar arthropod pests in infested domestic or industrial premises or in the control of mosquito larvae in waterways, wells, reservoirs or other running or standing water.

For the treatment of foundations, structures or soil in the prevention of the attack on building by termites, for example, Reticulitermes spp., Heterotermes spp., Coptotermes spp..

In agriculture against adults, larvae and eggs of Lepidoptera (butterflies and moths), e.g. Heliothis spp. such as Heliothis virescens (tobacco budworm), Heliothis armigera and Heliothis zea. Against adults and larvae of Coleoptera (beetles) e.g. Anthonomus spp. e.g. grandis (cotton boll weevil), Leptinotarsa decemlineata (Colorado potato beetle), Diabrotica spp. (corn rootworms). Against Heteroptera (Hemiptera and Homoptera) e.g. Psylla spp., Bemisia spp., Trialeurodes spp., Aphis spp., Myzus spp., Megoura viciae, Phylloxera spp., Nephotettix spp. (rice leaf hoppers), Nilaparvata spp..

Against Diptera e.g. Musca spp.. Against Thysanoptera such as Thrips tabaci. Against Orthoptera such as Locusta and Schistocerca spp., (locusts and crickets) e.g. Gryllus spp., and Acheta spp. for example, Blatta orientalis, Periplaneta americana, Blatella germanica, Locusta migratoria migratorioides, and Schistocerca gregaria. Against Collembola e.g. Periplaneta spp. and Blatella spp. (roaches). Against arthropods of agricultural significance such as Acari (mites) e.g. Tetranychus spp., and Panonychus spp..

Against nematodes which attack plants or trees of importance to agriculture, forestry or horticulture either directly or by spreading bacterial, viral, mycoplasma or fungal diseases of the plants. For example root-knot nematodes such as Meloidogyne spp. (e.g. M. incognita).

In the field of veterinary medicine or livestock husbandry or in the maintenance of public health against arthropods which are parasitic internally or externally upon vertebrates, particularly warm-blooded vertebrates, for example domestic animals, e.g. cattle, sheep, goats, equines, swine, poultry, dogs or cats, for example Acarina, including ticks (e.g. soft-bodied ticks including Argasidae spp. e.g. Argas spp. and Ornithodorus spp. (e.g. Ornithodorus moubata); hard-bodied ticks including Ixodidae spp., e.g. Boophilus spp. e.g. Boophilus microplus, Rhipicephalus spp. e.g. Rhipicephalus appendiculatus and Rhipicephalus sanguineus; mites (e.g. Damalinia spp.); fleas (e.g. Ctenocephalides spp. e.g. Ctenocephalides felis (cat flea) and Ctenocephalides canis (dog flea)); lice e.g. Menopon spp.; Diptera (e.g. Aedes spp., Anopheles spp., Musca spp., Hypoderma spp.); Hemiptera.; Dictyoptera (e.g. Periplaneta spp., Blatella spp.); Hymenoptera; for example against infections of the

gastro-intestinal tract caused by parasitic nematode worms, for example members of the family Trichostrongylidae.

In a preferred aspect of the invention the compounds of formula (I) are used for the control of parasites of animals. Preferably the animal to be treated is a domestic companion animal such as a dog or a cat.

In a further aspect of the invention the compounds of formula (I) or salts or compositions thereof are used for the preparation of a veterinary medicament.

In practical use for the control of arthropods, especially insects or mites, or helminths, especially nematode pests of plants, a method, for example, comprises applying to the plants or to the medium in which they grow an effective amount of a compound of the invention. For such a method, the compound of the invention is generally applied to the locus in which the arthropod or nematode infestation is to be controlled at an effective rate in the range of about 2g to about 1kg of the active compound per hectare of locus treated. Under ideal conditions, depending on the pest to be controlled, a lower rate may offer adequate protection. On the other hand, adverse weather conditions, resistance of the pest or other factors may require that the active ingredient be used at higher rates. The optimum rate depends usually upon a number of factors, for example, the type of pest being controlled, the type or the growth stage of the infested plant, the row spacing or also the method of application. Preferably an effective rate range of the active compound is from about 10g/ha to about 400g/ha, more preferably from about 50g/ha to about 200 g/ha. When a pest is soil-borne, the active compound generally in a formulated composition, is distributed evenly over the area to be treated (ie, for example broadcast or band treatment) in any convenient manner and is applied at rates from about 10g/ha to about 400g ai/ha, preferably from about 50g/ha to about 200 g ai/ha. When applied as a root dip to seedlings or drip irrigation to plants the liquid solution or suspension contains from about 0.075 to about 1000 mg ai/l, preferably from about 25 to about 200 mg ai/l. Application may be made, if desired, to the field or crop-growing area generally or in close proximity to the seed or plant to be protected

from attack. The compound of the invention can be washed into the soil by spraying with water over the area or can be left to the natural action of rainfall. During or after application, the formulated compound can, if desired, be distributed mechanically in the soil, for example by ploughing, disking, or use of drag chains. Application can be prior to planting, at planting, after planting but before sprouting has taken place, or after sprouting.

The compound of the invention and methods of control of pests therewith are of particular value in the protection of field, forage, plantation, glasshouse, orchard or vineyard crops, of ornamentals, or of plantation or forest trees, for example: cereals (such as wheat or rice), cotton, vegetables (such as peppers), field crops (such as sugar beets, soybeans or oil seed rape), grassland or forage crops (such as maize or sorghum), orchards or groves (such as of stone or pit fruit or citrus), ornamental plants, flowers or vegetables or shrubs under glass or in gardens or parks, or forest trees (both deciduous and evergreen) in forests, plantations or nurseries.

They are also valuable in the protection of timber (standing, felled, converted, stored or structural) from attack, for example, by sawflies or beetles or termites.

They have applications in the protection of stored products such as grains, fruits, nuts, spices or tobacco, whether whole, milled or compounded into products, from moth, beetle, mite or grain weevil attack. Also protected are stored animal products such as skins, hair, wool or feathers in natural or converted form (e.g. as carpets or textiles) from moth or beetle attack as well as stored meat, fish or grains from beetle, mite or fly attack.

Additionally, the compound of the invention and methods of use thereof are of particular value in the control of arthropods or helminths which are injurious to, or spread or act as vectors of diseases domestic animals, for example those hereinbefore mentioned, and more especially in the control of ticks, mites, lice, fleas, midges, or biting, nuisance or myiasis flies. The compounds of the invention are particularly useful in controlling arthropods or helminths which are present inside domestic host animals or which feed in or on the skin or suck the blood of the animal, for which purpose they may be administered orally, parenterally, percutaneously or topically.

The compositions hereinafter described for application to growing crops or crop growing loci or as a seed dressing may, in general, alternatively be employed in the protection of stored products, household goods, property or areas of the general environment. Suitable means of applying the compounds of the invention include:
to growing crops as foliar sprays (for example as an in-furrow spray), dusts, granules, fogs or foams or also as suspensions of finely divided or encapsulated compositions as soil or root treatments by liquid drenches, dusts, granules, smokes or foams; to seeds of crops via application as seed dressings, e.g. by liquid slurries or dusts;
to animals infested by or exposed to infestation by arthropods or helminths, by parenteral, oral or topical application of compositions in which the active ingredient exhibits an immediate and/or prolonged action over a period of time against the arthropods or helminths, for example by incorporation in feed or suitable orally-ingestible pharmaceutical formulations, edible baits, salt licks, dietary supplements, pour-on formulations, sprays, baths, dips, showers, jets, dusts, greases, shampoos, creams, wax smears or livestock self-treatment systems;
to the environment in general or to specific locations where pests may lurk, including stored products, timber, household goods, or domestic or industrial premises, as sprays, fogs, dusts, smokes, wax-smears, lacquers, granules or baits, or in tricklefeeds to waterways, wells, reservoirs or other running or standing water.

The compounds of formula (I) are particularly useful for the control of parasites of animals when applied orally, and in a further preferred aspect of the invention the compounds of formula (I) are used for the control of parasites of animals by oral application. The compounds of the formula (I) or salts thereof may be administered before, during or after meals. The compounds of the formula (I) or salts thereof may be mixed with a carrier and/or foodstuff.
The compound of the formula (I) or salt thereof is administered orally in a dose to the animal in a dose range generally from 0.1 to 500 mg/kg of the compound of the formula (I) or salt thereof per kilogram of animal body weight (mg/kg).
The frequency of treatment of the animal, preferably the domestic animal to be treated by the compound of the formula (I) or salt thereof is generally from about

once per week to about once per year, preferably from about once every two weeks to once every three months.

The compounds of the invention may be administered most advantageously with another parasiticidally effective material, such as an endoparasiticide, and/or an ectoparasiticide, and/or an endectoparasiticide. For example, such compounds include macrocyclic lactones such as avermectins or milbemycins e.g., ivermectin, pyratel or an insect growth regulator such as lufenuron or methoprene.

The compounds of the formula (I) can also be employed for controlling harmful organisms in crops of known genetically engineered plants or genetically engineered plants yet to be developed. As a rule, the transgenic plants are distinguished by especially advantageous properties, for example by resistances to particular crop protection agents, resistances to plant diseases or pathogens of plant diseases, such as particular insects or microorganisms such as fungi, bacteria or viruses. Other particular properties concern, for example, the harvested material with regard to quantity, quality, storage properties, composition and specific constituents. Thus, transgenic plants are known where the starch content is increased, or the starch quality is altered, or where the harvested material has a different fatty acid composition.

The use in economically important transgenic crops of useful plants and ornamentals is preferred, for example of cereals such as wheat, barley, rye, oats, millet, rice, cassava and maize or else crops of sugar beet, cotton, soya, oilseed rape, potatoes, tomatoes, peas and other types of vegetables.

When used in transgenic crops, in particular those which have resistances to insects, effects are frequently observed, in addition to the effects against harmful organisms to be observed in other crops, which are specific for application in the transgenic crop in question, for example an altered or specifically widened spectrum of pests which can be controlled, or altered application rates which may be employed for application.

The invention therefore also relates to the use of compounds of the formula (I) for controlling harmful organisms in transgenic crop plants.

According to a further feature of the present invention there is provided a pesticidal composition comprising one or more compounds of the invention as defined above, in association with, and preferably homogeneously dispersed in one or more compatible pesticidally acceptable diluents or carriers and/or surface active agents [i.e. diluents or carriers and/or surface active agents of the type generally accepted in the art as being suitable for use in pesticidal compositions and which are compatible with compounds of the invention].
In practice, the compounds of the invention most frequently form parts of compositions. These compositions can be employed to control arthropods, especially insects, or plant nematodes or mites. The compositions may be of any type known in the art suitable for application to the desired pest in any premises or indoor or outdoor area. These compositions contain at least one compound of the invention as the active ingredient in combination or association with one or more other compatible components which are for example, solid or liquid carriers or diluents, adjuvants, surface-active-agents, or the like appropriate for the intended use and which are agronomically or medicinally acceptable. These compositions, which may be prepared by any manner known in the art, likewise form a part of this invention.
The compounds of the invention, in their commercially available formulations and in the use forms prepared from these formulations may be present in mixtures with other active substances such as insecticides, attractants, sterilants, acaricides, nematicides, fungicides, growth regulatory substances or herbicides.

The pesticides include, for example, phosphoric esters, carbamates, carboxylic esters, formamidines, tin compounds and materials produced by microorganisms.

Preferred components in mixtures are:

1. from the group of the phosphorus compounds
acephate, azamethiphos, azinphos-ethyl, azinphos-methyl, bromophos, bromophos-ethyl, cadusafos (F-67825), chlorethoxyphos, chlorfenvinphos, chlormephos, chlorpyrifos, chlorpyrifos-methyl, demeton, demeton-S-methyl, demeton-S-methyl sulfone, dialifos, diazinon, dichlorvos, dicrotophos, dimethoate, disulfoton, EPN, ethion, ethoprophos, etrimfos, famphur, fenamiphos, fenitriothion, fensulfothion, fenthion, flupyrazofos, fonofos, formothion, fosthiazate, heptenophos, isazophos, isothioate, isoxathion, malathion, methacrifos, methamidophos, methidathion, salithion, mevinphos, monocrotophos, naled, omethoate, oxydemeton-methyl, parathion, parathion-methyl, phenthoate, phorate, phosalone, phosfolan, phosphocarb (BAS-301), phosmet, phosphamidon, phoxim, pirimiphos, pirimiphos-ethyl, pirimiphos-methyl, profenofos, propaphos, proetamphos, prothiofos, pyraclofos, pyridapenthion, quinalphos, sulprofos, temephos, terbufos, tebupirimfos, tetrachlorvinphos, thiometon, triazophos, trichlorphon, vamidothion;

2. from the group of the carbamates
alanycarb (OK-135), aldicarb, 2-sec-butylphenyl methylcarbamate (BPMC), carbaryl, carbofuran, carbosulfan, cloethocarb, benfuracarb, ethiofencarb, furathiocarb, HCN-801, isoprocarb, methomyl, 5-methyl-m-cumenylbutyryl (methyl)carbamate, oxamyl, pirimicarb, propoxur, thiodicarb, thiofanox, 1-methylthio(ethylideneamino)-N-methyl-N-(morpholinothio)carbamate (UC 51717), triazamate;

3. from the group of the carboxylic esters
acrinathrin, allethrin, alphametrin, 5-benzyl-3-furylmethyl (E)- (1R)-cis-2,2-dimethyl-3-(2-oxothiolan-3-ylidenemethyl)cyclopropanecarboxylate, beta-cyfluthrin, alpha-cypermethrin, beta-cypermethrin, bioallethrin, bioallethrin ((S)-cyclopentylisomer), bioresmethrin, bifenthrin, (RS)-1-cyano-1-(6-phenoxy-2-pyridyl)methyl (1RS)-trans-3-(4-tert-butylphenyl)-2,2-dimethylcyclopropanecarboxylate (NCI 85193), cycloprothrin, cyfluthrin, cyhalothrin, cythithrin, cypermethrin, cyphenothrin, deltamethrin, empenthrin, esfenvalerate, fenfluthrin, fenpropathrin, fenvalerate, flucythrinate, flumethrin, fluvalinate (D isomer), imiprothrin (S-41311), lambda-cyhalothrin, permethrin, phenothrin (® isomer), prallethrin, pyrethrins (natural products),

resmethrin, tefluthrin, tetramethrin, theta-cypermethrin, tralomethrin, transfluthrin, zeta-cypermethrin (F-56701);

4. from the group of the amidines
amitraz, chlordimeform;

5. from the group of the tin compounds
cyhexatin, fenbutatin oxide;

6. others
abamectin, ABG-9008, acetamiprid, acequinocyl, Anagrapha falcitera, AKD-1022, AKD-3059, ANS-118, azadirachtin, Bacillus thuringiensis, Beauveria bassianea, bensultap, bifenazate, binapacryl, BJL-932, bromopropylate, BTG-504, BTG-505, buprofezin, camphechlor, cartap, chlorobenzilate, chlorfenapyr, chlorfluazuron, 2-(4-chlorophenyl)-4,5-diphenylthiophene (UBI-T 930), chlorfentezine, chlorproxyfen, chromafenozide, clothianidine, 2-naphthylmethyl cyclopropanecarboxylate (Ro12-0470), cyromazin, diacloden (thiamethoxam), diafenthiuron, DBI-3204, ethyl 2-chloro-N-(3,5-dichloro-4-(1,1,2,3,3,3-hexafluoro-1-propyloxy)phenyl)carbamoyl)-2-carboximidate, DDT, dicofol, diflubenzuron, N-(2,3-dihydro-3-methyl-1,3-thiazol-2-ylidene)-2,4-xylidine, dihydroxymethyldihydroxypyrrolidine, dinobuton, dinocap, diofenolan, emamectin benzoate, endosulfan, ethiprole (sulfethiprole), ethofenprox, etoxazole, fenazaquin, fenoxycarb, fipronil, flonicamid (IKI-220), fluazuron, flumite (flufenzine, SZI-121), 2-fluoro-5-(4-(4-ethoxyphenyl)-4-methyl-1-pentyl)diphenyl ether (MTI 800), granulosis and nuclear polyhedrosis viruses, fenpyroximate, fenthiocarb, fluacrypyrim, flubenzimine, flubrocythrinate, flucycloxuron, flufenoxuron, flufenzine, flufenprox, fluproxyfen, gamma-HCH, halfenozide, halofenprox, hexaflumuron (DE_473), hexythiazox, HOI-9004, hydramethylnon (AC 217300), indoxacarb, ivermectin, L-14165, imidacloprid, indoxacarb (DPX-MP062), kanemite (AKD-2023), lufenuron, M-020, M-020, methoxyfenozide, milbemectin, NC-196, neemgard, nidinoterfuran, nitenpyram, 2-nitromethyl-4,5-dihydro-6H-thiazine (DS 52618), 2-nitromethyl-3,4-dihydrothiazole (SD 35651), 2-nitromethylene-1,2-thiazinan-3-ylcarbamaldehyde (WL 108477), novaluron, pirydaryl, propargite, protrifenbute,

pymethrozine, pyridaben, pyrimidifen, pyriproxyfen, NC-196, NC-1111, NNI-9768, novaluron (MCW-275), OK-9701, OK-9601, OK-9602, OK-9802, R-195, RH-0345, RH-2485, RYI-210, S-1283, S-1833, SI-8601, silafluofen, silomadine (CG-177), spinosad, spirodiclofen, SU-9118, tebufenozide, tebufenpyrad, teflubenzuron, tetradifon, tetrasul, thiacloprid, thiocyclam, thiamethoxam, tolfenpyrad, triazamate, triethoxyspinosyn A, triflumuron, verbutin, vertalec (mykotal), YI-5301.

The abovementioned components for combinations are known active substances, many of which are described in Ch.R Worthing, S.B. Walker, The Pesticide Manual, 12th Edition, British Crop Protection Council, Farnham 2000.

The effective use doses of the compounds employed in the invention can vary within wide limits, particularly depending on the nature of the pest to be eliminated or degree of infestation, for example, of crops with these pests. In general, the compositions according to the invention usually contain about 0.05 to about 95% (by weight) of one or more active ingredients according to the invention, about 1 to about 95% of one or more solid or liquid carriers and, optionally, about 0.1 to about 50% of one or more other compatible components, such as surface-active agents or the like. In the present account, the term "carrier" denotes an organic or inorganic ingredient, natural or synthetic, with which the active ingredient is combined to facilitate its application, for example, to the plant, to seeds or to the soil. This carrier is therefore generally inert and it must be acceptable (for example, agronomically acceptable, particularly to the treated plant).

The carrier may be a solid, for example, clays, natural or synthetic silicates, silica, resins, waxes, solid fertilizers (for example ammonium salts), ground natural minerals, such as kaolins, clays, talc, chalk, quartz, attapulgite, montmorillonite, bentonite or diatomaceous earth, or ground synthetic minerals, such as silica, alumina, or silicates especially aluminium or magnesium silicates. As solid carriers for granules the following are suitable: crushed or fractionated natural rocks such as calcite, marble, pumice, sepiolite and dolomite; synthetic granules of inorganic or organic meals; granules of organic material such as sawdust, coconut shells, corn cobs, corn husks or tobacco stalks; kieselguhr, tricalcium phosphate, powdered cork,

or absorbent carbon black; water soluble polymers, resins, waxes; or solid fertilizers. Such solid compositions may, if desired, contain one or more compatible wetting, dispersing, emulsifying or colouring agents which, when solid, may also serve as a diluent.

The carrier may also be liquid, for example: water; alcohols, particularly butanol or glycol, as well as their ethers or esters, particularly methylglycol acetate; ketones, particularly acetone, cyclohexanone, methylethyl ketone, methylisobutylketone, or isophorone; petroleum fractions such as paraffinic or aromatic hydrocarbons, particularly xylenes or alkyl naphthalenes; mineral or vegetable oils; aliphatic chlorinated hydrocarbons, particularly trichloroethane or methylene chloride; aromatic chlorinated hydrocarbons, particularly chlorobenzenes; water-soluble or strongly polar solvents such as dimethylformamide, dimethyl sulphoxide, or N-methylpyrrolidone; liquefied gases; or the like or a mixture thereof.

The surface-active agent may be an emulsifying agent, dispersing agent or wetting agent of the ionic or non-ionic type or a mixture of such surface-active agents. Amongst these are e.g., salts of polyacrylic acids, salts of lignosulphonic acids, salts of phenolsulphonic or naphthalenesulphonic acids, polycondensates of ethylene oxide with fatty alcohols or fatty acids or fatty esters or fatty amines, substituted phenols (particularly alkylphenols or arylphenols), salts of sulphosuccinic acid esters, taurine derivatives (particularly alkyltaurates), phosphoric esters of alcohols or of polycondensates of ethylene oxide with phenols, esters of fatty acids with polyols, or sulphate, sulphonate or phosphate functional derivatives of the above compounds. The presence of at least one surface-active agent is generally essential when the active ingredient and/or the inert carrier are only slightly water soluble or are not water soluble and the carrier agent of the composition for application is water.

Compositions of the invention may further contain other additives such as adhesives or colorants. Adhesives such as carboxymethylcellulose or natural or synthetic polymers in the form of powders, granules or lattices, such as arabic gum, polyvinyl alcohol or polyvinyl acetate, natural phospholipids, such as cephalins or lecithins, or synthetic phospholipids can be used in the formulations. It is possible to use colorants such as inorganic pigments, for example: iron oxides, titanium oxides or Prussian Blue; organic dyestuffs, such as alizarin dyestuffs, azo dyestuffs or metal

phthalocyanine dyestuffs; or trace nutrients such as salts of iron, manganese, boron, copper, cobalt, molybdenum or zinc.

For their agricultural application, the compounds of the invention are therefore generally in the form of compositions, which are in various solid or liquid forms.

Solid forms of compositions which can be used are dusting powders (with a content of the compound of the invention, ranging up to 80%), wettable powders or granules (including water dispersible granules), particularly those obtained by extrusion, compacting, impregnation of a granular carrier, or granulation starting from a powder (the content of the compound of the invention, in these wettable powders or granules being between about 0.5 and about 80%). Solid homogenous or heterogenous compositions containing one or more compounds of the invention, for example granules, pellets, briquettes or capsules, may be used to treat standing or running water over a period of time. A similar effect may be achieved using trickle or intermittent feeds of water dispersible concentrates as described herein.

Liquid compositions, for example, include aqueous or non-aqueous solutions or suspensions (such as emulsifiable concentrates, emulsions, flowables, dispersions, or solutions) or aerosols. Liquid compositions also include, in particular, emulsifiable concentrates, dispersions, emulsions, flowables, aerosols, wettable powders (or powder for spraying), dry flowables or pastes as forms of compositions which are liquid or intended to form liquid compositions when applied, for example as aqueous sprays (including low and ultra-low volume) or as fogs or aerosols.

Liquid compositions, for example, in the form of emulsifiable or soluble concentrates most frequently comprise about 5 to about 80% by weight of the active ingredient, while the emulsions or solutions which are ready for application contain, in their case, about 0.01 to about 20% of the active ingredient. Besides the solvent, the emulsifiable or soluble concentrates may contain, when required, about 2 to about 50% of suitable additives, such as stabilizers, surface-active agents, penetrating agents, corrosion inhibitors, colorants or adhesives. Emulsions of any required concentration, which are particularly suitable for application, for example, to plants, may be obtained from these concentrates by dilution with water. These compositions are included within the scope of the compositions which may be

employed in the present invention. The emulsions may be in the form of water-in-oil or oil-in-water type and they may have a thick consistency.

The liquid compositions of this invention may, in addition to normal agricultural use applications be used for example to treat substrates or sites infested or liable to infestation by arthropods (or other pests controlled by compounds of this invention) including premises, outdoor or indoor storage or processing areas, containers or equipment or standing or running water.

All these aqueous dispersions or emulsions or spraying mixtures can be applied, for example, to crops by any suitable means, chiefly by spraying, at rates which are generally of the order of about 100 to about 1,200 liters of spraying mixture per hectare, but may be higher or lower (eg. low or ultra-low volume) depending upon the need or application technique. The compound or compositions according to the invention are conveniently applied to vegetation and in particular to roots or leaves having pests to be eliminated. Another method of application of the compounds or compositions according to the invention is by chemigation, that is to say, the addition of a formulation containing the active ingredient to irrigation water. This irrigation may be sprinkler irrigation for foliar pesticides or it can be ground irrigation or underground irrigation for soil or for systemic pesticides.

The concentrated suspensions, which can be applied by spraying, are prepared so as to produce a stable fluid product which does not settle (fine grinding) and usually contain from about 10 to about 75% by weight of active ingredient, from about 0.5 to about 30% of surface-active agents, from about 0.1 to about 10% of thixotropic agents, from about 0 to about 30% of suitable additives, such as anti-foaming agents, corrosion inhibitors, stabilizers, penetrating agents, adhesives and, as the carrier, water or an organic liquid in which the active ingredient is poorly soluble or insoluble Some organic solids or inorganic salts may be dissolved in the carrier to help prevent settling or as antifreezes for water.

The wettable powers (or powder for spraying) are usually prepared so that they contain from about 10 to about 80% by weight of active ingredient, from about 20 to about 90% of a solid carrier, from about 0 to about 5% of a wetting agent, from about 3 to about 10% of a dispersing agent and, when necessary, from about 0 to about 80% of one or more stabilizers and/or other additives, such as penetrating agents,

adhesives, anti-caking agents, colorants, or the like. To obtain these wettable powders, the active ingredient is thoroughly mixed in a suitable blender with additional substances which may be impregnated on the porous filler and is ground using a mill or other suitable grinder. This produces wettable powders, the wettability and the suspendability of which are advantageous. They may be suspended in water to give any desired concentration and this suspension can be employed very advantageously in particular for application to plant foliage.

The "water dispersible granules (WG)" (granules which are readily dispersible in water) have compositions which are substantially close to that of the wettable powders. They may be prepared by granulation of formulations described for the wettable powders, either by a wet route (contacting finely divided active ingredient with the inert filler and a little water, e.g. 1 to 20% by weight, or with an aqueous solution of a dispersing agent or binder, followed by drying and screening), or by a dry route (compacting followed by grinding and screening).

The rates and concentrations of the formulated compositions may vary according to the method of application or the nature of the compositions or use thereof. Generally speaking, the compositions for application to control arthropod or plant nematode pests usually contain from about 0.00001% to about 95%, more particularly from about 0.0005% to about 50% by weight of one or more compounds of the invention, or of total active ingredients (that is to say the compounds of the invention, together with other substances toxic to arthropods or plant nematodes, synergists, trace elements or stabilizers). The actual compositions employed and their rate of application will be selected to achieve the desired effect(s) by the farmer, livestock producer, medical or veterinary practitioner, pest control operator or other person skilled in the art.

Solid or liquid compositions for application topically to animals, timber, stored products or household goods usually contain from about 0.00005% to about 90%, more particularly from about 0.001% to about 10%, by weight of one or more compounds of the invention. For administration to animals orally or parenterally, including percutaneously solid or liquid compositions, these normally contain from about 0.1% to about 90% by weight of one or more compounds of the invention. Medicated feedstuffs normally contain from about 0.001% to about 3% by weight of

one or more compounds of the invention. Concentrates or supplements for mixing with feedstuffs normally contain from about 5% to about 90%, preferably from about 5% to about 50%, by weight of one or more compounds of the invention. Mineral salt licks normally contain from about 0.1% to about 10% by weight of one or more compounds of formula (I) or pesticidally acceptable salts thereof.

Dusts or liquid compositions for application to livestock, goods, premises or outdoor areas may contain from about 0.0001% to about 15%, more especially from about 0.005% to about 2.0%, by weight, of one or more compounds of the invention. Suitable concentrations in treated waters are between about 0.0001 ppm and about 20 ppm, more particularly about 0.001 ppm to about 5.0 ppm. of one or more compounds of the invention, and may be used therapeutically in fish farming with appropriate exposure times. Edible baits may contain from about 0.01% to about 5%, preferably from about 0.01% to about 1.0%, by weight, of one or more compounds of the invention.

When administered to vertebrates parenterally, orally or by percutaneous or other means, the dosage of compounds of the invention, will depend upon the species, age, or health of the vertebrate and upon the nature and degree of its actual or potential infestation by arthropod or helminth pests. A single dose of about 0.1 to about 100 mg, preferably about 2.0 to about 20.0 mg, per kg body weight of the animal or doses of about 0.01 to about 20.0 mg, preferably about 0.1 to about 5.0 mg, per kg body weight of the animal per day, for sustained medication, are generally suitable by oral or parenteral administration. By use of sustained release formulations or devices, the daily doses required over a period of months may be combined and administered to animals on a single occasion.

The following composition EXAMPLES 2A - 2M illustrate compositions for use against arthropods, especially mites or insects, or plant nematodes, which comprise, as active ingredient, compounds of the invention, such as those described in preparative examples. The compositions described in EXAMPLES 2A - 2M can each be diluted to give a sprayable compositon at concentrations suitable for use in the field. Generic chemical descriptions of the ingredients (for which all of the following percentages are in weight percent), used in the composition EXAMPLES 2A - 2M exemplified below, are as follows:

| Trade Name | Chemical Description |
|---|---|
| Ethylan BCP | Nonylphenol ethylene oxide condensate |
| Soprophor BSU | Tristyrylphenol ethylene oxide condensate |
| Arylan CA | A 70% w/v solution of calcium dodecylbenzenesulfonate |
| Solvesso 150 | Light $C_{10}$ aromatic solvent |
| Arylan S | Sodium dodecylbenzenesulfonate |
| Darvan $NO_2$ | Sodium lignosulphonate |
| Celite PF | Synthetic magnesium silicate carrier |
| Sopropon T36 | Sodium salts of polycarboxylic acids |
| Rhodigel 23 | Polysaccharide xanthan gum |
| Bentone 38 | Organic derivative of magnesium montmorillonite |
| Aerosil | Microfine silicon dioxide |

EXAMPLE 2A

A water soluble concentrate is prepared with the composition as follows:

| | |
|---|---|
| Active ingredient | 7% |
| Ethylan BCP | 10% |
| N-methylpyrrolidone | 83% |

To a solution of Ethylan BCP dissolved in a portion of N-methylpyrrolidone is added the active ingredient with heating and stirring until dissolved. The resulting solution is made up to volume with the remainder of the solvent.

EXAMPLE 2B

An emulsifiable concentrate (EC) is prepared with the composition as follows:

| | |
|---|---|
| Active ingredient | 25%(max) |
| Soprophor BSU | 10% |
| Arylan CA | 5% |
| N-methylpyrrolidone | 50% |
| Solvesso 150 | 10% |

The first three components are dissolved in N-methylpyrrolidone and to this is then added the Solvesso 150 to give the final volume.

EXAMPLE 2C

A wettable powder (WP) is prepared with the composition as follows:

| | |
|---|---|
| Active ingredient | 40% |
| Arylan S | 2% |
| Darvan $NO_2$ | 5% |
| Celite PF | 53% |

The ingredients are mixed and ground in a hammer-mill to a powder with a particle size of less than 50 microns.

EXAMPLE 2D

An aqueous-flowable formulation is prepared with the composition as follows:

| | |
|---|---|
| Active ingredient | 40.00% |
| Ethylan BCP | 1.00% |
| Sopropon T360. | 0.20% |
| Ethylene glycol | 5.00% |
| Rhodigel 230. | 0.15% |
| Water | 53.65% |

The ingredients are intimately mixed and are ground in a bead mill until a mean particle size of less than 3 microns is obtained.

EXAMPLE 2E

An emulsifiable suspension concentrate is prepared with the composition as follows:

| | |
|---|---|
| Active ingredient | 30.0% |
| Ethylan BCP | 10.0% |
| Bentone 38 | 0.5% |
| Solvesso 150 | 59.5% |

The ingredients are intimately mixed and ground in a beadmill until a mean particle size of less than 3 microns is obtained.

EXAMPLE 2F

A water dispersible granule is prepared with the composition as follows:

| | |
|---|---|
| Active ingredient | 30% |
| Darvan No 2 | 15% |
| Arylan S | 8% |
| Celite PF | 47% |

The ingredients are mixed, micronized in a fluid-energy mill and then granulated in a rotating pelletizer by spraying with water (up to 10%). The resulting granules are dried in a fluid-bed drier to remove excess water.

EXAMPLE 2G

A dusting powder is prepared with the composition as follows:

| | |
|---|---|
| Active ingredient | 1 to 10% |
| Talc powder-superfine | 99 to 90% |

The ingredients are intimately mixed and further ground as necessary to achieve a fine powder. This powder may be appplied to a locus of arthropod infestation, for example refuse dumps, stored products or household goods or animals infested by, or at risk of infestation by, arthropods to control the arthropods by oral ingestion. Suitable means for distributing the dusting powder to the locus of arthropod infestation include mechanical blowers, handshakers or livestock self treatment devices.

EXAMPLE 2H

An edible bait is prepared with the composition as follows:

| | |
|---|---|
| Active ingredient | 0.1 to 1.0% |
| Wheat flour | 80% |
| Molasses | 19.9 to 19% |

The ingredients are intimately mixed and formed as required into a bait form. This edible bait may be distributed at a locus, for example domestic or industrial premises, e.g. kitchens, hospitals or stores, or outdoor areas, infested by arthropods, for example ants, locusts, cockroaches or flies, to control the arthropods by oral ingestion.

EXAMPLE 2I

A solution formulation is prepared with a composition as follows:

| | |
|---|---|
| Active ingredient | 15% |
| Dimethyl sulfoxide | 85% |

The active ingredient is dissolved in dimethyl sulfoxide with mixing and or heating as required. This solution may be applied percutaneously as a pour-on application to domestic animals infested by arthropods or, after sterilization by filtration through a polytetrafluoroethylene membrane (0.22 micrometer pore size), by parenteral injection, at a rate of application of from 1.2 to 12 ml of solution per 100 kg of animal body weight.

EXAMPLE 2J

A wettable powder is prepared with the composition as follows:

| | |
|---|---|
| Active ingredient | 50% |
| Ethylan BCP | 5% |
| Aerosil | 5% |
| Celite PF | 40% |

The Ethylan BCP is absorbed onto the Aerosil which is then mixed with the other ingredients and ground in a hammer-mill to give a wettable powder, which may be diluted with water to a concentration of from 0.001% to 2% by weight of the active compound and applied to a locus of infestation by arthropods, for example, dipterous larvae or plant nematodes, by spraying, or to domestic animals infested by, or at risk of infection by arthropods, by spraying or dipping, or by oral administration in drinking water, to control the arthropods.

EXAMPLE 2K

A slow release bolus composition is formed from granules containing the following components in varying percentages(similar to those described for the previous compositions) depending upon need:

Active ingredient
Density agent
Slow-release agent
Binder

The intimately mixed ingredients are formed into granules which are compressed into a bolus with a specific gravity of 2 or more. This can be administered orally to ruminant domestic animals for retention within the reticulo-rumen to give a continual slow release of active compound over an extended period of time to control infestation of the ruminant domestic animals by arthropods.

EXAMPLE 2L

A slow release composition in the form of granules, pellets, brickettes or the like can be prepared with compositions as follows:

Active ingredient 0.5 to 25%
Polyvinyl chloride 75 to 99.5%
Dioctyl phthalate (plasticizer)

The components are blended and then formed into suitable shapes by melt-extrusion or molding. These composition are useful, for example, for addition to standing water or for fabrication into collars or eartags for attachment to domestic animals to control pests by slow release.

EXAMPLE 2M

A water dispersible granule is prepared with the composition as follows:

| | |
|---|---|
| Active ingredient | 85%(max) |
| Polyvinylpyrrolidone | 5% |
| Attapulgite clay | 6% |
| Sodium lauryl sulfate | 2% |
| Glycerine | 2% |

The ingredients are mixed as a 45% slurry with water and wet milled to a particle size of 4 microns, then spray-dried to remove water.

METHODS OF PESTICIDAL USE

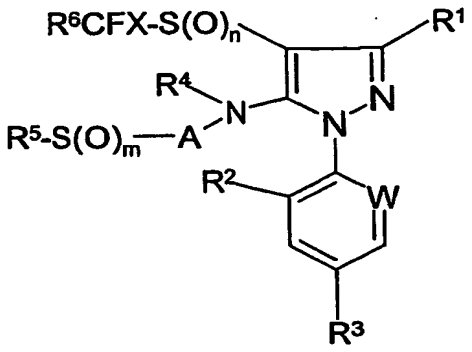
The following representative test procedure, using compounds of the invention, was conducted to determine the parasiticidal activity of the compounds of the invention.

METHOD A: Screening method to test systemicity of compounds against Ctenocephalides felis (Cat flea)

A test container was filled with 10 adults of Ctenocephalides felis. A glass cylinder was closed on one end with parafilm and placed on top of the test container. The test compound solution was then pipetted into bovine blood and added to the glass cylinder. The treated Ctenocephalides felis were held in this artificial dog test (blood 37 °C, 40-60 % relative humidity; Ctenocephalides felis 20-22°C, 40-60 % relative humidity) and assessment performed at 24 and 48 hours after application. Compound numbers 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 1-8, 1-9, 7-2, 7-3, 7-4, 7-9 and 8-1 gave at least 80% control of Ctenocephalides felis at a test concentration of 5ppm or less.

CLAIMS

1. A compound of formula (I):



(I)

wherein:

$R^1$ is $CSNH_2$ or $C(=N\text{-}Z)\text{-}S(O)_r\text{-}Q$;

W is C-halogen or N;

$R^2$ is hydrogen or Cl;

$R^3$ is $CF_3$, $OCF_3$ or $SF_5$;

Q is $(C_1\text{-}C_6)$-alkyl or $-CH_2R^7$;

Z is H, $(C_1\text{-}C_6)$-alkyl, $(C_1\text{-}C_6)$-haloalkyl, $(C_3\text{-}C_6)$-alkenyl, $(C_3\text{-}C_6)$-alkynyl, $-(CH_2)_qR^7$, $COR^8$, $CO_2\text{-}(C_1\text{-}C_6)$-alkyl, $S(O)_pR^8$, $CO_2\text{-}CH_2R^7$, $CO_2\text{-}(C_3\text{-}C_6)$-alkenyl or $CO_2\text{-}(C_3\text{-}C_6)$-alkynyl;

$R^4$ is hydrogen, $(C_2\text{-}C_6)$-alkenyl, $(C_2\text{-}C_6)$-haloalkenyl, $(C_2\text{-}C_6)$-alkynyl, $(C_2\text{-}C_6)$-haloalkynyl, $(C_3\text{-}C_7)$-cycloalkyl, $(C_3\text{-}C_7)$-cycloalkyl-$(C_1\text{-}C_6)$-alkyl, $CO_2\text{-}(C_3\text{-}C_6)$-alkenyl, $CO_2\text{-}(C_3\text{-}C_6)$-alkynyl, $-CO_2\text{-}(CH_2)_q\text{-}R^7$, $-CH_2R^7$, $-CH_2R^9$, $OR^7$, $OR^8$, $COCO_2R^{10}$ or $COCONR^{10}R^{11}$; or $CO_2\text{-}(C_1\text{-}C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1\text{-}C_3)$-alkoxy and $(C_1\text{-}C_3)$-alkylthio; or $(C_1\text{-}C_6)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1\text{-}C_6)$-alkoxy, $(C_1\text{-}C_6)$-haloalkoxy, $(C_3\text{-}C_7)$-cycloalkyl, $S(O)_pR^8$ and $CO_2\text{-}(C_1\text{-}C_6)$-alkyl;

A is $(C_1\text{-}C_6)$-alkylene or $(C_1\text{-}C_6)$-haloalkylene;

$R^5$ is $(C_2\text{-}C_6)$-alkenyl, $(C_2\text{-}C_6)$-haloalkenyl, $(C_2\text{-}C_6)$-alkynyl, $(C_3\text{-}C_6)$-cycloalkyl or $-(CH_2)_qR^7$; or $(C_1\text{-}C_6)$-alkyl unsubstituted or substituted by one or more radicals

selected from the group consisting of halogen, $(C_1-C_6)$-alkoxy, $(C_1-C_6)$-haloalkoxy, $(C_3-C_7)$-cycloalkyl, $S(O)_pR^8$ and $CO_2-(C_1-C_6)$-alkyl;
X is F or Cl;
$R^6$ is F, Cl or Br;
$R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_6)$-alkyl, $(C_1-C_6)$-haloalkyl, $(C_1-C_6)$-alkoxy, $(C_1-C_6)$-haloalkoxy, CN, $NO_2$, $S(O)_pR^8$, $CO_2-(C_1-C_6)$-alkyl, $COR^8$, $NR^{12}R^{13}$ and OH;
$R^8$ is $(C_1-C_6)$-alkyl or $(C_1-C_6)$-haloalkyl;
$R^9$ is a heteroaromatic radical having 5 or 6 ring atoms and 1, 2 or 3 hetero atoms in the ring selected from the group consisting of N, O and S, unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_4)$-alkyl, $(C_1-C_4)$-haloalkyl, $(C_1-C_4)$-alkoxy, $(C_1-C_4)$-haloalkoxy, $NO_2$, CN, $CO_2(C_1-C_6)$-alkyl, $S(O)_pR^8$ and OH;
$R^{10}$ and $R^{11}$ are each independently H or $R^5$;
or the radical $NR^{10}R^{11}$ forms a five- to seven-membered saturated ring which optionally contains an additional hetero atom in the ring which is selected from O, S and N, the ring being unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_6)$-alkyl, $(C_1-C_6)$-haloalkyl and $CO_2-(C_1-C_6)$-alkyl;
$R^{12}$ and $R^{13}$ are each independently H or $(C_1-C_6)$-alkyl;
m, n, p and r are each independently zero, one or two; and
q is zero or one;
or a pesticidally acceptable salt thereof.

2. A compound or a salt thereof as claimed in claim 1 wherein $R^1$ is $CSNH_2$ or C(=N-Z)-S-Q, wherein Z is H and Q is $(C_1-C_3)$-alkyl.

3. A compound or a salt thereof as claimed in claim 1 or 2 wherein $R^6$ and X are both F.

4. A compound or a salt thereof as claimed in claim 1, 2 or 3 wherein $R^1$ is $CSNH_2$ or C(=NH)-S-Q;

W is C-Cl;
$R^2$ is Cl;
$R^3$ is $CF_3$ or $OCF_3$;
Q is $(C_1-C_3)$-alkyl;
$R^4$ is $(C_2-C_4)$-alkenyl, $(C_2-C_4)$-alkynyl, $(C_3-C_7)$-cycloalkyl, $CO_2-(C_1-C_3)$-alkyl, $CO_2-(C_3-C_4)$-alkenyl, $CO_2-(C_3-C_4)$-alkynyl or $-CO_2-(CH_2)_q-R^7$; or $(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, $(C_3-C_7)$-cycloalkyl, $S(O)_pR^8$ and $CO_2-(C_1-C_3)$-alkyl;
A is $(C_1-C_4)$-alkylene or $(C_1-C_4)$-haloalkylene;
$R^5$ is $(C_3-C_6)$-cycloalkyl or $-(CH_2)_qR^7$; or $(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, $(C_3-C_6)$-cycloalkyl, $S(O)_pR^8$ and $CO_2-(C_1-C_3)$-alkyl;
X is F or Cl;
$R^6$ is F or Cl;
$R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkyl, $(C_1-C_3)$-haloalkyl, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, CN, $NO_2$, $S(O)_pR^8$, $CO_2-(C_1-C_3)$-alkyl, $COR^8$, $NR^{12}R^{13}$ and OH;
$R^8$ is $(C_1-C_3)$-alkyl or $(C_1-C_3)$-haloalkyl;
$R^{12}$ and $R^{13}$ are each independently H or $(C_1-C_3)$-alkyl;
m, n and p are each independently zero, one or two; and
q is zero or one.

5. A compound or a salt thereof as claimed in any one of claims 1 to 4 wherein
$R^1$ is $CSNH_2$ or C(=NH)-S-Q;
W is C-Cl;
$R^2$ is Cl;
$R^3$ is $CF_3$ or $OCF_3$;
Q is $(C_1-C_3)$-alkyl;
$R^4$ is $CO_2-(C_1-C_3)$-alkyl, $CO_2-(C_3-C_4)$-alkenyl, $CO_2-(C_3-C_4)$-alkynyl or $-CO_2-(CH_2)_q-R^7$; or $(C_1-C_3)$-alkyl;
A is $(C_1-C_4)$-alkylene;

$R^5$ is $(C_3-C_6)$-cycloalkyl or $-(CH_2)_qR^7$; or $(C_1-C_3)$-alkyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, $(C_3-C_6)$-cycloalkyl, $S(O)_pR^8$ and $CO_2-(C_1-C_3)$-alkyl;

X is F or Cl;

$R^6$ is F or Cl;

$R^7$ is phenyl unsubstituted or substituted by one or more radicals selected from the group consisting of halogen, $(C_1-C_3)$-alkyl, $(C_1-C_3)$-haloalkyl, $(C_1-C_3)$-alkoxy, $(C_1-C_3)$-haloalkoxy, CN, $NO_2$ and $S(O)_pR^8$;

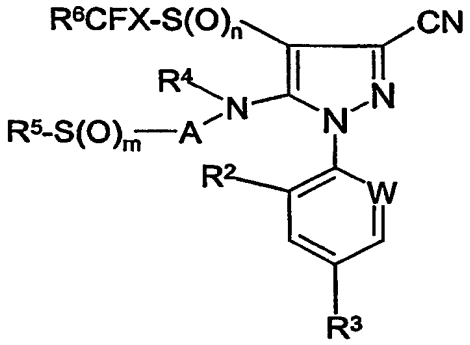
$R^8$ is $(C_1-C_3)$-alkyl or $(C_1-C_3)$-haloalkyl;

m, n and p are each independently zero, one or two; and

q is zero or one.

6. A process for the preparation of a compound of formula (I) or a salt thereof as defined in any one of claims 1 to 5, which process comprises:

a) where $R^1$ is $CSNH_2$, and $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, W, A, X, m and n are as defined in claim 1, reacting a compound of formula (II):




(II)

wherein $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, W, A, X, m and n are as defined in formula (I), with an alkali or alkaline earth metal hydrosulfide; or

b) where $R^1$ is $CSNH_2$, and $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, W, A, X, m and n are as defined in claim 1, reacting a compound of formula (II) as defined above with a bis(trialkylsilyl)sulfide, in the presence of a base; or

c) where $R^1$ is C(=NH)-S-Q, and Q, $R^2$, $R^3$, $R^4$, $R^5$, $R^6$, W, A, X, m and n are as defined in claim 1, reacting a compound of formula (I) wherein $R^1$ is $CSNH_2$ with an alkylating agent of formula (III) or (IV):

Q-L (III) $Q_3O^+BF_4^-$ (IV)

wherein Q is as defined in formula (I) and L is a leaving group; or

d) where $R^1$ is C(=N-Z)-S-Q, Z is as defined in claim 1 with the exclusion of H, and the other values are as defined in formula (I), alkylating, acylating or sulfonylating the corresponding compound of formula (I) wherein Z is H, with a compound of formula (V):

$Z\text{-}L^1$ (V)

wherein Z is as defined in formula (I) with the exclusion of H, and $L^1$ is a leaving group; and

(e) if desired, converting a resulting compound of formula (I) into a pesticidally acceptable salt thereof.

7. A pesticidal composition comprising a compound of formula (I) or a pesticidally acceptable salt thereof as defined in any one of claims 1 to 5, in association with a pesticidally acceptable diluent or carrier and/or surface active agent.

8. The use of a compound of formula (I) or a salt thereof according to any one of claims 1 to 5 or of a composition according to claim 7, for the preparation of a veterinary medicament.

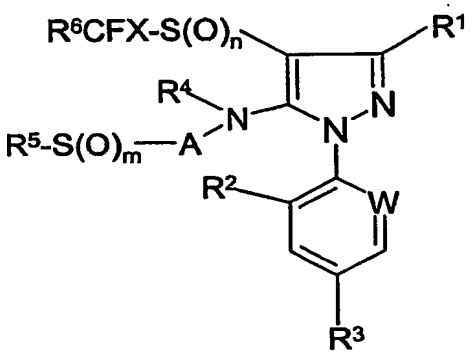
9. The use of a compound of formula (I) or a salt thereof according to any one of claims 1 to 5 or of a composition according to claim 7, for the control of pests.

10. A method for controlling pests at a locus which comprises applying thereto an effective amount of a compound of formula (I) or a salt thereof as claimed in any one of claims 1 to 5 or of a composition according to claim 7.

ABSTRACT

Pesticides

The invention relates to 5-substituted-alkylaminopyrazole derivatives of formula (I) or salts thereof:




(I)

wherein the various symbols are as defined in the description, to processes for their preparation, to compositions thereof, and to their use for the control of pests (including arthropods and helminths).

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